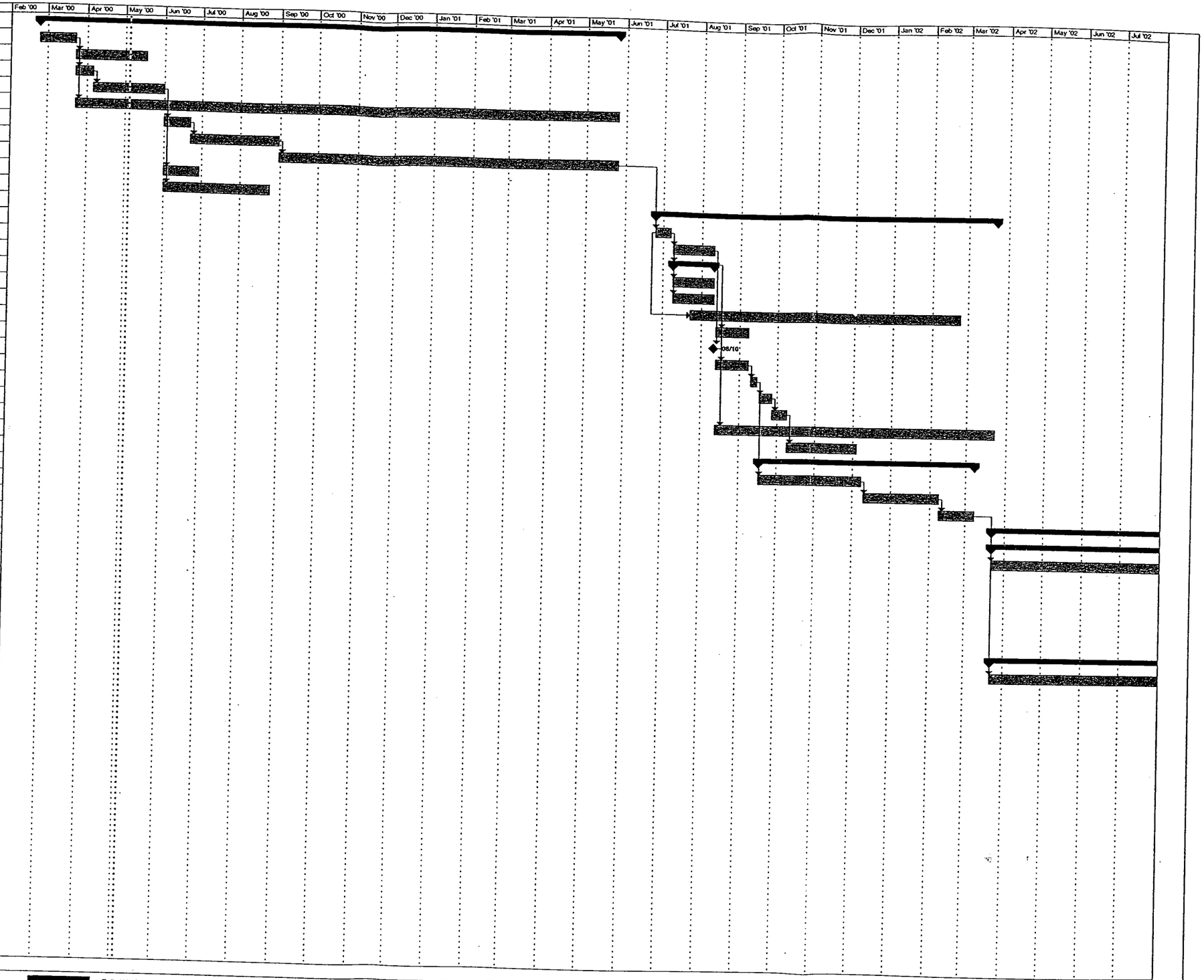
ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	**Planning Phase**	**327 days**	**Thu 02/24/00**	**Fri 05/25/01**		
2	Identify Potential Project Ar	20 days	Thu 02/24/00	Wed 03/22/00		
3	Develop Preliminary Enviro	40 days	Thu 03/23/00	Wed 05/17/00	2	
4	Identify Existing Applicatior	10 days	Thu 03/23/00	Wed 04/05/00	2	
5	Identify (First Round) Spec	40 days	Thu 04/06/00	Wed 05/31/00	4	
6	Public Involvement	307 days	Thu 03/23/00	Fri 05/25/01	2	
7	Assess Existing Wastewat	15 days	Thu 06/01/00	Wed 06/21/00	5	
8	Develop Site Specific Feas	50 days	Thu 06/22/00	Wed 08/30/00	7	
9	Develop EIS-SEPA Proces	192 days	Thu 08/31/00	Fri 05/25/01	8	
10	Identify Governance Issues	20 days	Thu 06/01/00	Wed 06/28/00	5	
11	Communications with Stak	60 days	Thu 06/01/00	Wed 08/23/00	5	
12	**Pre-design Phase**	**195 days**	**Mon 06/25/01**	**Fri 03/22/02**		
13	Evaluate Site Build-out Nee	10 days	Mon 06/25/01	Fri 07/06/01	9FS+20 days	
14	Evaluate Treatment Alterna	25 days	Mon 07/09/01	Fri 08/10/01	13	
15	**Evaluate Conveyance Alt**	**25 days**	**Mon 07/09/01**	**Fri 08/10/01**	**13**	
16	Satellite Facilities	25 days	Mon 07/09/01	Fri 08/10/01	13	
17	Application Site Modifi	25 days	Mon 07/09/01	Fri 08/10/01	13	
18	Public Involvement	155 days	Mon 07/23/01	Fri 02/22/02	13SS+20 days	
19	Evaluate Real Estate Need	20 days	Mon 08/13/01	Fri 09/07/01	15	
20	Risk Assessment and Risk	0 days	Fri 08/10/01	Fri 08/10/01	14	
21	Identify Facilities Operation	20 days	Mon 08/13/01	Fri 09/07/01	20	
22	Develop Cost Estimates	5 days	Mon 09/10/01	Fri 09/14/01	21	
23	Develop Business Plan	8 days	Mon 09/17/01	Wed 09/26/01	22	
24	Refine Governance Issues	8 days	Thu 09/27/01	Mon 10/08/01	23	
25	Develop Supplemental EIS	160 days	Mon 08/13/01	Fri 03/22/02	15	
26	Communications with Stak	40 days	Tue 10/09/01	Mon 12/03/01	24	
27	**Prepare Engineering Rep**	**124 days**	**Mon 09/17/01**	**Thu 03/07/02**		
28	Draft Report	60 days	Mon 09/17/01	Fri 12/07/01	22	
29	Stakeholder Review	44 days	Mon 12/10/01	Thu 02/07/02	28	
30	Final Report	20 days	Fri 02/08/02	Thu 03/07/02	29	
31	**Design Phase**	**275 days**	**Fri 03/22/02**	**Thu 04/10/03**		
32	**Prepare Satellite Facilitie**	**275 days**	**Fri 03/22/02**	**Thu 04/10/03**		
33	50% Design	120 days	Fri 03/22/02	Thu 09/05/02	30FS+10 days	
34	99% Design	80 days	Fri 09/06/02	Thu 12/26/02	33	
35	Submittal to DOE and	45 days	Fri 12/27/02	Thu 02/27/03	34	
36	Final Design	30 days	Fri 02/28/03	Thu 04/10/03	35	
37	Develop Cost Estimate	10 days	Fri 08/23/02	Thu 09/05/02	33FF	
38	Develop Construction	10 days	Fri 08/23/02	Thu 09/05/02	33FF	
39	**Prepare Application Sites**	**275 days**	**Fri 03/22/02**	**Thu 04/10/03**		
40	50% Design	120 days	Fri 03/22/02	Thu 09/05/02	30FS+10 days	
41	99% Design	80 days	Fri 09/06/02	Thu 12/26/02	33	
42	Submittal to DOE and	45 days	Fri 12/27/02	Thu 02/27/03	41	
43	Final Design	30 days	Fri 02/28/03	Thu 04/10/03	35	
44	Develop Cost Estimate	10 days	Fri 08/23/02	Thu 09/05/02	33FF	
45	Develop Construction	10 days	Fri 08/23/02	Thu 09/05/02	33FF	
46	**Permitting and Public Inv**	**155 days**	**Fri 09/06/02**	**Thu 04/10/03**		
47	Submit Documents for	45 days	Fri 12/27/02	Thu 02/27/03	34	
48	Real Estate Appraisal	40 days	Fri 09/06/02	Thu 10/31/02	33	
49	Negotiations with Lanc	60 days	Fri 11/01/02	Thu 01/23/03	48	
50	Final Permitting	30 days	Fri 02/28/03	Thu 04/10/03	47	
51	Completion of Govern.	20 days	Fri 02/28/03	Thu 03/27/03	47	
52	Communications with	30 days	Fri 02/28/03	Thu 04/10/03	47	
53	**Construction Phase**	**635 days**	**Fri 04/25/03**	**Thu 09/29/05**		
54	**Satellite Facilities**	**635 days**	**Fri 04/25/03**	**Thu 09/29/05**		
55	Bid and Award	85 days	Fri 04/25/03	Thu 08/21/03	36FS+10 days	
56	Construction	230 days	Fri 09/05/03	Thu 07/22/04	55FS+10 days	
57	Public Involvement	80 days	Fri 04/30/04	Thu 08/19/04	58FF	
	Startup and Training	20 days	Fri 07/23/04	Thu 08/19/04	56	



Project: Reuse Schedule-Subtask 360
Date: Thu 05/04/00

Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary

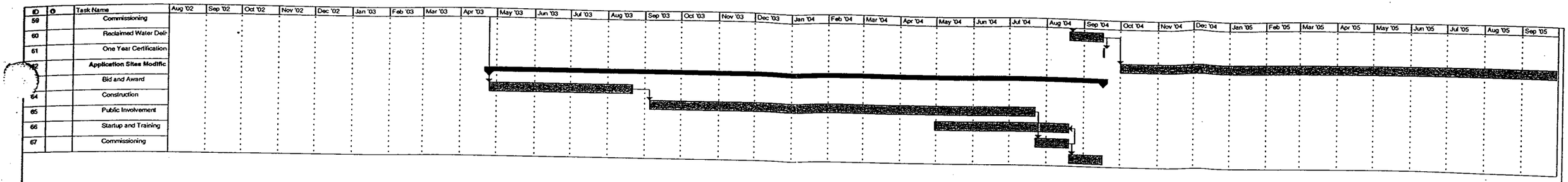
ID	Task Name
1	**Planning Phase**
2	Identify Potential Project Aj
3	Develop Preliminary Enviro
4	Identify Existing Applicatior
5	Identify (First Round) Spec
6	Public Involvement
7	Assess Existing Wastewat
8	Develop Site Specific Feas
9	Develop EIS-SEPA Proces
10	Identify Governance Issues
11	Communications with Stak
12	**Pre-design Phase**
13	Evaluate Site Build-out Ne
14	Evaluate Treatment Alterna
15	**Evaluate Conveyance Alt**
16	Satellite Facilities
17	Application Site Modifi
18	Public Involvement
19	Evaluate Real Estate Need
20	Risk Assessment and Risk
21	Identify Facilities Operation
22	Develop Cost Estimates
23	Develop Business Plan
24	Refine Governance Issues
25	Develop Supplemental EIS
26	Communications with Stak
27	**Prepare Engineering Rep**
28	Draft Report
29	Stakeholder Review
30	Final Report
1	**Design Phase**
2	**Prepare Satellite Facilitie**
33	50% Design
34	99% Design
35	Submittal to DOE and
36	Final Design
37	Develop Cost Estimat
38	Develop Construction
39	**Prepare Application Sites**
40	50% Design
41	99% Design
42	Submittal to DOE and
43	Final Design
44	Develop Cost Estimat
45	Develop Construction
46	**Permitting and Public Inv**
47	Submit Documents for
48	Real Estate Appraisal
49	Negotiations with Land
50	Final Permitting
51	Completion of Govern
52	Communications with
53	**Construction Phase**
54	**Satellite Facilities**
55	Bid and Award
56	Construction
57	Public Involvement
	Startup and Training

Aug '02 | Sep '02 | Oct '02 | Nov '02 | Dec '02 | Jan '03 | Feb '03 | Mar '03 | Apr '03 | May '03 | Jun '03 | Jul '03 | Aug '03 | Sep '03 | Oct '03 | Nov '03 | Dec '03 | Jan '04 | Feb '04 | Mar '04 | Apr '04 | May '04 | Jun '04 | Jul '04 | Aug '04 | Sep '04 | Oct '04 | Nov '04 | Dec '04 | Jan '05 | Feb '05 | Mar '05 | Apr '05 | May '05 | Jun '05 | Jul '05 | Aug '05 | Sep '05

Project: Reuse Schedule-Subtask 360
Date: Thu 05/04/00

Task | Progress | Summary | Rolled Up Split | Rolled Up Progress | Project Summary
Split | Milestone | Rolled Up Task | Rolled Up Milestone | External Tasks

ID		Task Name
59		Commissioning
60		Reclaimed Water Deli
61		One Year Certification
62		**Application Sites Modific**
63		Bid and Award
64		Construction
65		Public Involvement
66		Startup and Training
67		Commissioning



Project: Reuse Schedule-Subtask 360
Date: Thu 05/04/00

Task | Progress | Summary | Rolled Up Split | Rolled Up Progress | Project Summary
Split | Milestone | Rolled Up Task | Rolled Up Milestone | External Tasks

King County Department of Natural Resources
Request for Project Nominations
Identification of Potential Water Reuse Satellite Projects

Section I: Introduction

King County, through the Department of Natural Resources (KCDNR), is in the process of identifying a variety of reclaimed water projects across the county. To supplement and to help identify additional viable projects, KCDNR is requesting written project nominations from public and private parties that are interested in joining with KCDNR in implementing water reuse projects. These projects could provide reclaimed water for industrial uses, irrigation or other purposes. KCDNR wants to identify potential non-potable water reuse demonstration projects throughout King County with the ultimate goal of constructing one or more satellite projects to be permitted, designed, owned and operated by KCDNR that would provide reclaimed water for appropriate, beneficial, and cost effective purposes. These projects will be included along with other activities in the KCDNR reclaimed water work program. KCDNR intends to allocate up to $20 million between now and 2008 to conduct appropriate, beneficial and cost-effective demonstration projects. KCDNR will seek to obtain matching federal, state and other local funds as projects become identified. For example, KCDNR is interested in working with the Washington State Department of Ecology which has been allocated $1 million to acquire water rights.

KCDNR defines a satellite project as one that can be integrated into the regional wastewater system. It would include a reclaimed water production facility that is sized to meet specific reclaimed water needs in the vicinity. The satellite project would not process solids onsite and would have the capability to be entirely bypassed with wastewater flows remaining in the regional wastewater system, if necessary.

In general, the objectives of this Request for Project Nominations (RFN) are to identify feasible, direct non-potable, water reuse demonstration projects that could be implemented and to:

- Encourage cities, other governmental entities, businesses, and other private institutions to participate in the development of reclaimed water in the region;
- Provide reclaimed water to existing irrigation water users to free up water presently being extracted from a river or well, thus providing base flows for fish and/or providing additional flushing flows for smolts;
- Meet new and existing water demands for industrial, irrigation or other water uses, thus stretching limited potable water supplies;
- Educate the public with respect to reclaimed water and its potential to reduce existing and future out-of-stream uses of water from local streams, rivers, creeks, and wells;

- Encourage smaller, innovative proposals for partnership with KCDNR regarding the development of reclaimed water, and
- Identify a demonstration project or grouping of projects that can be served by a satellite reclaimed water production facility with a nominal capacity of 1 to 5 million gallons per day.

This RFN is the first of a two-phase approach to assist in identifying reclaimed water projects. The second phase will occur between March 15th and April 30th and will involve the successful nominator(s), if any, and KCDNR working together to further develop the proposed project(s). The goal would be to develop feasibility level planning information for the necessary facilities and identify the commensurate regional benefits. The overall intent is that the process will result in the incorporation of the successful nominations into KCDNR's reclaimed water program.

For information related to technical content, submission procedures, or state regulations and requirements (regulatory agencies should not be contacted at this time in the process), contact:

Tom Fox, Project Manager
King County Department of Natural Resources
201 S. Jackson Street, Suite 700
Seattle, WA 98104
(206) 296-5279

Section II: Background

KCDNR is interested in pursuing opportunities to assist the region in balancing the water resource needs of the environment and people. KCDNR currently discharges approximately 130 MGD of treated wastewater into Puget Sound during the summer and fall, and over 200 MGD on average in the winter. Highly-treated wastewater (reclaimed water) could be used as a water source and would reduce demands on existing water supply sources, delay the need to develop new sources, and potentially keep water in streams for fish. Typical reuse projects include using reclaimed water for non-potable applications, such as industrial processing, landscaping or agricultural use. Reclaimed water could also be used for indirect potable projects, such as diverting reclaimed water to large water bodies and withdrawing the same amount of water from elsewhere for domestic use; however these types of project uses are not part of this initial pilot program. KCDNR is interested in furthering development of semi-permanent and/or permanent reclaimed water projects in a manner safe for public health and the environment to meet the increasing demand for water supply, to enhance or maintain fish runs, and to mitigate Endangered Species Act (ESA) concerns. KCDNR has identified funds to develop reclaimed water demonstration projects and additional sources of funding will also be explored.

King County recently approved the Regional Wastewater Services Plan (RWSP), a policy and planning tool, to meet long-term wastewater needs in the King County service area. The reuse portion of the RWSP (the Reuse Plan) includes development of a reclaimed water work program, technology assessment, stakeholder participation process, public outreach and a

five-year funding plan for development of demonstration projects. This RFN addresses the demonstration satellite project feasibility and selection process for the Reuse Plan.

To be considered for evaluation, applications of reclaimed water must comply with all Department of Health and Department of Ecology guidelines, displace a commensurate amount of existing or new freshwater use, and/or provide a direct benefit to the environment. Local jurisdictions will be notified of any and all projects that are submitted which are located on privately owned sites within the jurisdiction's boundaries.

In addition, KCDNR reserves the right to combine, enhance and/or modify project proposals to develop facilities and partnerships that best meet the purposes of this RFN, as defined in Section I. KCDNR's goal is to combine a number of potential projects in an area to best support the development of a 1 to 5 MGD satellite facility that could be implemented within 2-5 years and produce benefits to both the environment and the community.

Section III: Proposal Contents

All proposals must be less than 10 pages including maps. The proposal is to be presented in two sections:

1. Basic Project Information, Attachment 1.
2. Screening Criteria used for initial screening, Attachment 2.

Subsection IIIA. Basic Project Information:

Subsection IIIA, Basic Project Information, Attachment 1, will present the basic project information, including project objectives and background, and an indication of the sponsoring agency/entity.

Subsection IIIB. Screening Criteria:

Subsection IIIB, Screening Criteria, Attachment 2, will be used for the initial screening of proposals. It is critical that this section be as complete as possible to ensure further consideration.

1. Source/Use. Identify the location for the use of reclaimed water. Identify the current source of water for this location. List the current ownership and zoning of the proposed site and adjacent land parcels. Thoroughly describe the proposed water reuse application(s), the required water reuse quality and the potential benefits associated with that use. Clearly indicate the proximity of the proposed application site(s) to the wastewater source (i.e. wastewater treatment plant or reclaimed water pipeline). The ideal projects will be in close proximity to the source of reclaimed water.

   If there are other potential uses in the vicinity, identify the location, water use and contact person, if available.

2. Volume. Identify the total volume of reclaimed water required and list the quantity of reclaimed water required for each use indicated in IIIB (1) above. Identify the total anticipated daily volume of water to be consumed by the user(s) listed above. Specify

whether water usage is seasonal or year round. Specify the amount currently being paid for water (1999 best estimate) by each user.

The ideal demonstration project will consist of one or a number of reclaimed water users, the sum of whose use results in a satellite treatment plant nominal capacity of 1 to 5 MGD.

The target amount of reclaimed water to be produced per nominated use is a peak flow rate of 250,000 gallons per day; the minimum acreage for irrigation is 40 acres. However, the seasonal and annual variation in water use is acknowledged. Projects with peak water use of less than 250,000 gallons per day may be considered. Smaller projects may also be considered if a proposed project can be integrated into a system involving other proposed projects, is shown to be located in the vicinity of an existing wastewater treatment plant, existing reclaimed water pipeline and/or has other interesting demonstration project characteristics.

3. Implementation. Based on available information, provide a best estimate of a preferred operational or on-line date. The ideal project can be implemented within 2 to 5 years.

4. Cost. If available, provide an approximate cost of the project as proposed within the boundaries of the project site. A feasibility level cost estimate, including on-site infrastructure, is all that is required.

   Selected projects may have further cost analysis conducted by KCDNR. Additional costs for other applicable projects in the vicinity and the costs for production and distribution may be added to this estimate by KCDNR. For selected projects, the total estimated cost for the needed facilities will be compared to other nominated sites to determine the most cost-effective projects.

   The information submitted will be used in conjunction with the screening criteria above and the program objectives presented in Section I to conduct the initial screening.

   To have a project considered for implementation under this RFN, submit six (6) copies of the complete package by 4:00 pm, Tuesday, February 22, 2000 to:

   Reclaimed Water Proposal Projects
   Attention: Tom Fox, Project Manager
   201 S. Jackson Street, Suite 700
   King County Department of Natural Resources
   Seattle, WA 98104

Section IV: Evaluation and Review Process

Subsection IVA. Schedule

KCDNR is committed to identifying those reuse projects which provide the greatest benefit to water resource issues, including water supply, wastewater programs, water quality, and instream flow issues. The schedule presented below includes an opportunity for nominators to interact with KCDNR and gather information. Nominators are encouraged to attend. The RFN evaluation process will thoroughly evaluate each nomination utilizing the items

identified in Section III as a minimum. All nominations will be screened according to evaluation criteria developed by KCDNR and a water reuse task force. The 'short listed' nominators of the selected projects will then be notified and a further refinement of available information will commence during a second phase to determine feasibility. The schedule for this process is summarized below:

Date	Nominations and Selection Process
January 18, 2000	Publish Announcement for Request for Project Nominations
January 25, 2000	Informational Event at Mercerview Community Center (Room A9), 8236 SE 24th Street, Mercer Island, 4:00 to 7:00 p.m., for nominators to receive information on KCDNR's program and meet other potential reuse partners
February 11, 2000	Distribution of Frequently Asked Questions
February 22, 2000	Project Nominations Due to KCDNR (4:00 PM)
March 15, 2000	Short Listed Nominations Announced

Subsection IVB. Technical Review Committee

A KCDNR Review Panel will evaluate all nominations.

Subsection IVC. Notification

KCDNR shall provide notification of the short-listed nominations and detailed instructions for Phase Two to all parties being considered at the time the action is taken. KCDNR reserves the right to group or combine projects with other projects identified by KCDNR. KCDNR may determine that the nominated projects are not suited for further development at this time.

Section V: Documents Available

The following documents are available for review by contacting Tom Fox, Project Manager with King County Department of Natural Resources at (206) 296-5279 between 9:00 AM and 5:00 PM, Monday through Friday.

1. Draft King County Technology Evaluation Report (2000)
2. King County Regional Wastewater Services Plan (1998)
3. Regional Wastewater Services Plan Policies (1999)
4. No Longer Wastewater: Water Reclamation and Reuse Implementation (WDOE and WDOH, 1997)
5. County map showing the regional wastewater conveyance system and treatment facilities

BASIC PROJECT INFORMATION

ATTACHMENT 1

1. **Sponsoring Agency/Entity** (describe who is the responsible party of the submittal and associated persons or entities authorized to make project commitments).

2. **Basic Project Background**

Contact Person(s) (name and phone number):

***Description*:**

Location:

***Need for Project*:**

Associated Water Rights:

3. **Project Objectives**

SCREENING CRITERIA

ATTACHMENT 2

1. Source and Use of Reclaimed Water

Water Use Location _____

City _____ Water District _____

Current Water Source _____

Property Owner _____ Property Zoning Designation _____

Describe Proposed Use for Reclaimed Water _____

_____

Water Quality Requirements (if known) _____

_____

Potential Benefits of Using Reclaimed Water at this Site _____

_____

Are there other potential reclaimed water opportunities near this site? _____

Locate the proposed water application site(s)and wastewater source on a map _____

2. Volume of Water Use

Amount of reclaimed water required (gallons/day) for each use described in #1 above _____

Water Use	**Volume (gal./day)**

Amount of water (gallons/day) currently used at site(s) listed above in #1 _____

Is current water use year-round or seasonal? _____

Describe water use pattern _____

_____

Amount currently paid for water at site(s) (1999 rates and/or operational costs) _____

3. Schedule

List anticipated date that proposed reclaimed water is needed or could be on-line (quarter/year) _____

What do you see as the critical elements in implementing this project? _____

Are there any construction scheduling issues the County should be aware of? _____

4. Feasibility Level Costs (within property boundaries of project site only)

TOTAL Estimated Project Cost on Project Site _____

Assumptions _____

_____

5. Other Considerations

What other factors would you like King County to consider to make this water reuse concept appealing? _____

Request for Project Nominations (RFN) - Frequently Asked Questions

TO: January 25 Informational Event Attendees and RFN Packet Request List.

COPIES: Tom Fox, King County Department of Natural Resources

FROM: Shannon Wilbur, CH2M HILL

DATE: February 11, 2000

As stated in the RFN, a list of frequently asked questions was to be distributed on February 11, 2000. These questions were collected during the January 25 Informational Event and during distribution of the RFN packets.

Q: *What is your proposal review process?*

A: We will be evaluating potential 'projects' for Phase I based on the information provided on the attachments in the RFN. That information will allow us to evaluate the benefits, magnitude of costs, and rank projects for Phase II.

Q: *Who will own the facilities?*

A: King County will own and operate the facilities because KC is the permit holder with the State and is liable for any problems associated with the treatment of the reclaimed water.

Q: *In what institutional direction are you heading? Are you looking for small scattered facilities or mega facilities?*

A: We are simply looking for opportunities. We have limited funds, thus we want to gather information to determine where we can gain the greatest benefit for the funds available.

Q: *What will be the role of the Cascade Water Alliance in the decision-making process?*

A: King County is interested in wholesaling the water. The role of the CWA in this process is uncertain at this time. King County is certainly supportive of CWA's vision, but we do plan to sell reclaimed water to the local purveyors.

Q: *Are you limiting the potential projects to 1-5 mgd?*

A: No, the projects can be smaller or larger. We are interested in identifying multiple uses in the aggregate. Once a site is identified, we will talk to the Water District or City that the site is located within to see if there might also be other users in the vicinity.

Q: *Would you consider DBO?*

A: Operations will only be done by King County. Design-Build could potentially be considered. The County is looking into that area.

Q: *You say you will wholesale to a Water District. What about to the end user?*

A: Our first choice is to wholesale. If the Water District is not interested in dealing with reclaimed water, then we will consider direct service.

Q: *What if the WWTP is remote and not connected to the King County regional system? Is that a valid project?*

A: Yes. King County is interested in all opportunities. Remote facilities could potentially serve to mitigate for ESA issues, thus we would seek funding for implementation of those types of projects also, which could include both state and federal funding. We are also willing to look outside King County because our regional system extends into Pierce and Snohomish County. The idea is to implement those projects with the greatest benefit that is cost effective. We would like to get a diversity of uses.

Q: *Do you have a target cost or cost-benefit ratio that you are looking for?*

A: We do not have any hard and fast numbers or targets right now. Ideally, we would like to see a cost benefit ratio of 1.0 or greater. But we must also factor in some intangible elements. The cost criteria could also vary by use.

Q: *How many nominations will you short list on March 15?*

A: No idea. We have not set a specific target.

Q: *Can you recommend other sites also?*

A: Yes, but in order to favorably rank the nomination, it must have the contact information of the person authorized to commit to working with the County. Ad hoc nominations will be put aside at this time.

Q: *Will the short-listed ones be the projects that have King County's attention?*

A: We have to look at the cost and benefits. We must also get concurrence from the stakeholders and owner before we can commit to a project.

Q: *Does 'cost-effective' also include reoccurring cost?*

A: Yes. It includes the cost to operate and the cost to deliver water.

Appendix C.2 Index

* TM AWSA 200 containing the Future Regional Wastewater Treatment Plant evaluation is located in Appendix D.

King County Reclaimed Water Assistance Program

Subtask 420 – Summary of Potential Projects

PREPARED FOR: Tom Fox/KCDNR

PREPARED BY: Dave Parkinson/CH2M HILL
Bill Persich/Brown and Caldwell

COPIES: Rick Kirkby/KCDNR
Greg Bush/KCDNR
John Smyth/KCDNR

DATE: May 5, 2000

REVISED DATE: June 14, 2000
July 24, 2000

Background

King County Department of Natural Resources (KCDNR) solicited project nominations from potential reclaimed water users in King County to evaluate the region's need and ability to support water reclamation demonstration plant(s). KCDNR received 11 different request for project nomination (RFN) responses from applicants representing 13 potential projects/areas within King County. This technical memorandum summarizes all of the potential projects, describes the initial screening process used by KCDNR to narrow down the responses, and presents the results of the screening process. More details on the subsequent evaluation process conducted on the final potential reuse projects are presented in Technical Memorandum 510.

Synopsis of Potential Projects

The 11 RFN responses received by KCDNR are summarized in this section. Table 1 is a summary of the RFN responses received. The information presented in the table and text is based solely on information provided by potential reclaimed water users in each RFN package, unless noted otherwise. Where consumption volumes were not provided, estimates were derived based on data for similar facilities, and estimated irrigated acreage combined with agronomic rates cited in the State of Washington Irrigation Guide. Annotated data and narrative are inserted within brackets in this section.

Projects are summarized by the organizations that submitted project nominations. The location of each site is presented later in the document in Figures 1 through 5. Forms 1 and 2 from each of the RFN packages received are compiled in Attachment 1.

TABLE 1
Summary of RFN Packages Submitted

Project	Location[1]	Acreage[2]	Current Water Source	Primary Reclaimed Water Use
Willows Run Golf Course	Redmond	300	Sammamish River	Seasonal Irrigation
Molbaks Greenhouse	Redmond	42	Onsite Wells	Irrigation
Woodinville Water District				
JB Instant Lawn	Redmond	250	Sammamish River	Seasonal Irrigation
Gold Creek Park	Redmond/ Woodinville	100	Woodinville WD	Seasonal Irrigation
Shoreline Water District				
York Pumping Station Area	Redmond/ Woodinville	- -	Sammamish River, Woodinville WD	Streamflow Augmentation
North Creek Area	Kenmore/ Bothell	- -	Woodinville WD	Seasonal Irrigation of Campus, Ballfields and Commercial Areas
Northshore Utility District				
Kenmore Small Users	Kenmore/ Bothell	- -	Northshore UD	Seasonal Irrigation of Schools
The Golf Club at Newcastle/ Mutual Materials Co.	Newcastle/ Bellevue	100	Coal Creek UD	Seasonal Irrigation/Process Water
Covington Water District	Covington/ Auburn	100-133	Covington WD, City of Auburn, Onsite Wells	Seasonal Irrigation of Schools, Parks and Golf Courses
Tam O'Shanter Golf Course	Bellevue	100	City of Bellevue	Seasonal Irrigation
Sammamish Plateau Water and Sewer District	Issaquah	- -	Sammamish Plateau WSD	Streamflow Augmentation
University of Washington	Seattle	100	City of Seattle	Seasonal Irrigation of Campus
City of Tukwila	Tukwila	- -	Tukwila WD	Process Water

NOTES: [1] – See Figures 1 through 5 for specific project location. Some of the sites are officially located in Unincorporated King County.
[2] – Acreage estimated where possible if it was not provided in the RFN packages.

Willows Run Golf Course

Willows Run Golf Course is a 45-hole golf course covering 300 acres of former farmland in the Sammamish River Valley. The course is currently irrigated between May-September using direct withdrawals from onsite wells (27 percent) and the Sammamish River (73

percent). Associated water rights include one groundwater right (750 gallons per minute [gpm] or 168 acre-ft/year) and two surface water rights (0.75 cubic feet per second [cfs] or 152 acre-ft/year and 1.0 cfs). [The validity of the water rights is in question.] Based on 1999 data, the course used a total of 49.5 million gallons (MG) between May-September, with a peak monthly demand of 0.55 million gallons per day (MGD).

Environmental benefits include decreased withdrawal of groundwater from the Sammamish Valley and surface water from the Sammamish River. Water quality is already monitored at the course. A water reuse program would also tie into an existing interpretive sign program at the golf course explaining the beneficial uses of wetlands. Preliminary capital facility costs associated with retrofitting existing golf course facilities to allow use of reclaimed water are expected to be $25,000, which is relatively low because the site already contains most of the necessary infrastructure (i.e., storage ponds, pumps, and irrigation lines). Onsite existing wetland ponds that are partially empty during the summer could be used for storage. Preliminary costs are associated with additional conveyance lines and minimal adaptation of existing infrastructure. Depending on the construction of a suitable regional reuse facility, reclaimed water could be used onsite as early as Summer 2002.

Molbaks Greenhouse

In addition to being nominated by both the Woodinville Water District and the Shoreline Water District, Molbaks Greenhouse also submitted an independent RFN package. The 42-acre site uses water for irrigating greenhouses on a continuous basis. Water is currently supplied from onsite groundwater and surface water facilities under two water claims. [The validity of the water claims is in question.] Although water is used year-round, the business estimates that the heaviest use is between May and July with an estimated use of 26,000 gallons per day.

Environmental benefits include decreased withdrawal of groundwater from the Sammamish Valley and surface water from the Sammamish River. Water quality is an important consideration due to the limited chemical tolerance of the nursery business. Preliminary costs were not included in the RFN package.

Woodinville Water District

Woodinville Water District submitted sites in their district that represent potential re-use satellite opportunities. These include JB Instant Lawn, Molbaks Greenhouse, and Gold Creek Park. JB Instant Lawn and Gold Creek Parks are summarized below, and Molbaks Greenhouse was discussed above separately because the company submitted an independent RFN.

- JB Instant Lawn currently withdraws water for sod irrigation directly from the Sammamish River. The volume, timing, and duration of water withdrawals is unknown at this time. [However, based on the assumption that water use during the May-September season would be similar to a golf course (i.e., 100 percent irrigation) the total volume of water may be over 160 MG, based on an estimated irrigated acreage of 250 acres. Over the 5-month summer/fall season, preliminary peak day demands were estimated to be approximately 1.6 MGD.] Woodinville Water District was unable to provide any cost analysis for this property because of the uncertainty of water use.

- Gold Creek Park is approximately 100 acres of public land that is irrigated between May-September. Although the park purchases its water from the Woodinville Water District, specific volumes and durations were not provided in the RFN package. [However, previous work conducted on parks in this region (*Refine Alternatives for Effluent Reuse at the Blakely Ridge/Northridge Master Plan Developments, CH2M HILL, 1993*), determined that on average, 25% of a park's land is irrigated. Assuming that 25 acres of Gold Creek Park is irrigated, then this park could use about 16 MG of water between May-September, with a peak day demand of 0.16 MGD.] The Woodinville Water District did not provide any cost analysis for this property.

Shoreline Water District (1)

The first RFN proposal submitted by the Shoreline Water District addressed potential re-use candidates near the York Pump Station. These sites include Molbaks Greenhouse, 60-Acres Soccer Field, Mueller Farm, Redwood Golf Range, and Gold Creek Athletic Club. The Molbaks and 60-Acres Soccer Field sites are addressed separately in this memorandum. Preliminary uses of reclaimed water include streamflow augmentation and seasonal irrigation. Specific breakdowns of actual water use between potential users was not provided, although the district estimates that a peak daily demand of up to 2.0 MGD could be substituted with reuse water.

Environmental benefits include augmenting and improving Sammamish River stream flows by reducing water temperatures. Preliminary cost estimates range from $6–12 million for treatment of 1.0–2.0 MGD and $0.8–1.6 million for distribution from the treatment plant. The project is part of a reuse program being pursued by the district that includes a pilot water treatment plant in Lake Forest Park.

Shoreline Water District (2)

The second RFN proposal submitted by the Shoreline Water District addressed potential re-use candidates in the Bothell/Kenmore Area near the North Creek Pump Station. These sites include University of Washington (Bothell Campus), North Creek Ballfields, and various commercial office parks (e.g., YMCA, Seattle Times). Between May-September, the total volume of water necessary to supply irrigation and provide process water may be 25 MG. Aggregate peak day demand may be approximately 0.3 MGD.

Environmental benefits include augmenting and improving Sammamish River stream flows by reducing water temperatures. Preliminary cost estimates range from $2–4 million for treatment of 0.25–0.50 MGD and $0.8–1.6 million for distribution from the treatment plant. The project is part of a reuse program being pursued by the district that includes a pilot water treatment plant in Lake Forest Park.

Northshore Utility District

Northshore Utility District identified 11 possible car washes and schools within its service area as candidates for potential water re-use. [Additional candidates included Evergreen Hospital and Inglewood Golf Course; however, water consumption and types of use for the hospital is unknown and the golf course is discussed separately in this memorandum.] The

car washes use a relatively small volume of water (0.009 MGD) on a continuous basis, while schools use up to a peak of 0.059 MGD during the summer for irrigation.

Although the Northshore Utility District currently provides water to all of these users, no preliminary cost analysis was provided in the RFN. Primary benefits of using reclaimed water at these sites include reducing the overall demand on the district's water system to stretch existing potable supplies.

The Golf Club at Newcastle/Mutual Materials Co.

This project would rely on reclaimed water to irrigate the Golf Club at Newcastle and provide process water for Mutual Materials Co. The 18-hole golf course is currently irrigated between May-September using potable water purchased from the Coal Creek Utility District. Mutual Materials Co. uses potable water on a continuous basis for manufacturing processes. Total water use between May-September is currently estimated at nearly 77 MG for the golf course and the manufacturing business. Current peak rates are estimated at slightly over 0.5–1.0 MGD.

Primary benefits of using reclaimed water at these sites include reducing the overall demand on the district's water system to stretch existing potable supplies. Conceptual design for this project was completed prior to the KCDNR RFN request and is based on a plant capacity of 0.5 MGD, with adjustments between 0.1–1.0 MGD possible. Preliminary costs associated with using reclaimed water are expected to be $2.4–3.0 million, which includes retrofitting an existing force main and installing distribution piping. Both of the users will be ready and prepared to receive reclaimed water beginning in the Spring of 2000.

Covington Water District

Covington Water District proposes to used reclaimed water to irrigate schools, parks, and/or golf courses. The RFN does not specifically identify which sites would be used as reclaimed water projects, but between May-September the total volume of water necessary may be up to 36 MG. Aggregate peak day demands are estimated to be 0.5 MGD. [These demands may be higher if additional sites, especially golf courses, are included within the project.]

Primary benefits of using reclaimed water at these sites include reducing the overall demand on the district's water system to stretch existing potable supplies. Environmental benefits include potentially increasing base flows for streams. Preliminary cost estimates are $4 million for distribution (a treatment plant is not part of the estimated cost). This cost is based on an estimated $1.5–2 million per 50-acre site.

Tam O'Shanter Golf Course

Tam O'Shanter Golf Course is currently irrigated between May-September using potable water purchased from the City of Bellevue. Based on user data, the course uses a total of 17.6 MG between May-September, with a peak daily demand of 0.2 MGD.

Preliminary costs were not included in the RFN package. However, onsite costs are expected to be minimal because the existing irrigation system would need to be modified only slightly to accommodate reclaimed water. Primary benefits of using reclaimed water at

this site include reducing the overall demand on the city's water system to stretch existing potable supplies.

Sammamish Plateau Water and Sewer District

The construction of a water reclamation plant would potentially allow Sammamish Plateau Water and Sewer District to discharge reclaimed water into Issaquah Creek for streamflow augmentation and groundwater recharge. The district currently holds eight water right certificates, several permits, and several applications for additional groundwater wells. Additional potable water is needed immediately (1.9 MGD) and an additional 5.6 MGD is projected to be needed by 2015 to meet system demands. Total reclaimed water use between May-September is estimated to be 150 MGD; the proposed project is expected to produce 1.0 MGD on a continuous basis.

Primary benefits of using reclaimed water include augmenting streamflows and recharging potable groundwater supplies. Because the nature of the project impacts Issaquah Creek and Lake Sammamish, critical issues related to this project include demonstrating phosphorous removal technology and calculating the extent of groundwater continuity between Lake Sammamish and the district's current groundwater supply. The district estimates that a plant capacity with 1.0 MGD capacity would cost between $5–7 million, with an additional $240,000 necessary for phosphorus treatment studies and hydraulic analyses.

University of Washington

This project would rely on reclaimed water to irrigate 100 acres of athletic fields on the Seattle campus. The fields are currently irrigated between May-September using potable water purchased from the City of Seattle. Current total water use between these months is 60 MG, which is equivalent to an average use of 0.4 MGD.

Preliminary costs were not included in the RFN package. However, onsite costs are expected to be minimal because the existing irrigation system would need to be modified only slightly to accommodate reclaimed water. A primary benefit of using reclaimed water at this site includes reducing the overall demand on the city's water system to stretch existing potable supplies.

City of Tukwila

Along Interurban Avenue, numerous sites are present that could use reclaimed water for irrigation, process, and maintenance purposes. Specific sites include the Interurban Ballfields and the Seattle Rendering Facility. [Sewer flushing activities proposed in the RFN package were not included in this analysis because these activities would occur during the spring (i.e., to be consistent with other RFN packages, only May–September demands were considered).] Between May-September, the total volume of water necessary is expected to be 9.8 MG; this volume includes seasonal irrigation and process water for the rendering plant.

Preliminary cost estimates may be $0.35 million, most of which is allocated to piping and distribution systems. The use of reclaimed water at these sites would be part of the larger regional project within Renton.

Overview of RFN Process

Once the initial RFN packages were received by KCDNR, a number of projects were eliminated from further consideration within the context of this project based on a variety of factors. The purpose of the Sammamish Plateau Water and Sewer District proposal was to examine water reuse as a tool for streamflow augmentation. This proposal will be examined as part of a future phase of the reuse program when policies on streamflow augmentation will be discussed. The proposals from Tukwila and University of Washington are considered ongoing as part of different regional reuse projects and will be considered separately from this demonstration project process.

The remaining nominations were grouped into five potential projects based on their vicinity to a potential reclaimed water source and the estimated volume of reclaimed water that might be available. The projects are:

- Sammamish River (from Redmond to Woodinville)
- North Sammamish River (Kenmore area)
- The Golf Club at Newcastle and Mutual Materials Co. (south of Bellevue)
- Covington, and
- Tam O'Shanter Golf Course (in Bellevue)

Table 2 demonstrates how the projects were grouped for the final evaluation.

TABLE 2
Grouping of RFN Packages into Final Projects

RFN Package	Sammamish River	North Samm. River	Newcastle	Covington	Tam O'Shanter	On Hold
Willows Run Golf Course	X					
Molbaks Greenhouse	X					
Woodinville Water District	X					
Shoreline Water District (1)	X					X[a]
Shoreline Water District (2)		X				
Northshore Utility District		X				
The Golf Club at Newcastle/Mutual Materials			X			
Covington Water District				X		
Tam O'Shanter Golf Course					X	
Sammamish Plateau Water and Sewer District						X[a]
University of Washington						X
City of Tukwila						X
Other Redmond / Woodinville Users	X	X				
Other Kenmore / Bothell Users		X				
Other Covington/Kent Users				X		

[a] *the streamflow augmentation portion of the proposal may be considered in a future phase*

As stated above, the Covington project was listed as a project and included in the process; however, during the subsequent evaluation it was determined that there were insufficient wastewater flows available at the facility indicated in the RFN to meet the reclaimed water needs of the Covington project. The project remained in the process in order to establish base line parameters for comparison purposes and in the event that additional wastewater sources or volumes would be available in the future.

In addition to the RFN nominations received, KCDNR has identified other users associated with the Sammamish River, North Sammamish River, and Covington projects that may be potential candidates for reclaimed water use. These sites include Chateau Ste. Michelle Winery, Farm LCC and Hmong Farm in Woodinville, the Wayne and Inglewood Golf Courses in Bothell/Kenmore, and a golf course in the Covington area. These sites are discussed in more detail below because they have been incorporated into the evaluation process used to rank the five potential reuse projects.

Chateau Ste. Michelle Winery

This winery is used primarily for tourist purposes and includes a summertime concert amphitheater. Although the exact acreage is unknown, the entire facility may encompass up to 100 acres. For this analysis, it was assumed that 80 acres are irrigated. Using agronomic rates, it is estimated that this site could use at least 50 MG of water between May-September, with a peak day demand of 0.53 MGD.

Farm LCC and Hmong Farm

Each of these farms are estimated to have 47 irrigated acres. Current irrigation water sources are unknown. Using agronomic rates, it is estimated that each of these farms may use approximately 30 MG during the irrigation season with a peak day demand of 0.3 mgd.

Wayne Golf Course and Inglewood Golf Course

These 18-hole golf courses are located in the Kenmore/Bothell area and are currently believed to be served by direct groundwater withdrawal. Specific usage rates are unknown at this time. Using agronomic rates, it is estimated that a 100-acre golf course could use 65 MG of water between May-September, with a peak day demand of 0.66 MGD.

Covington Golf Courses

There are a number of golf courses located in the Covington area. Although the RFN submitted mentioned potentially serving golf courses with reclaimed water, no specific facilities were identified. Therefore, one golf course (Elk Run Golf Course) has been chosen to represent a potential water reuse project in the Covington area.

Figures 1 through 5 present the location of the proposed application sites described previously.

Figure 1

Reclaimed Water Project Evaluation: Sammamish River

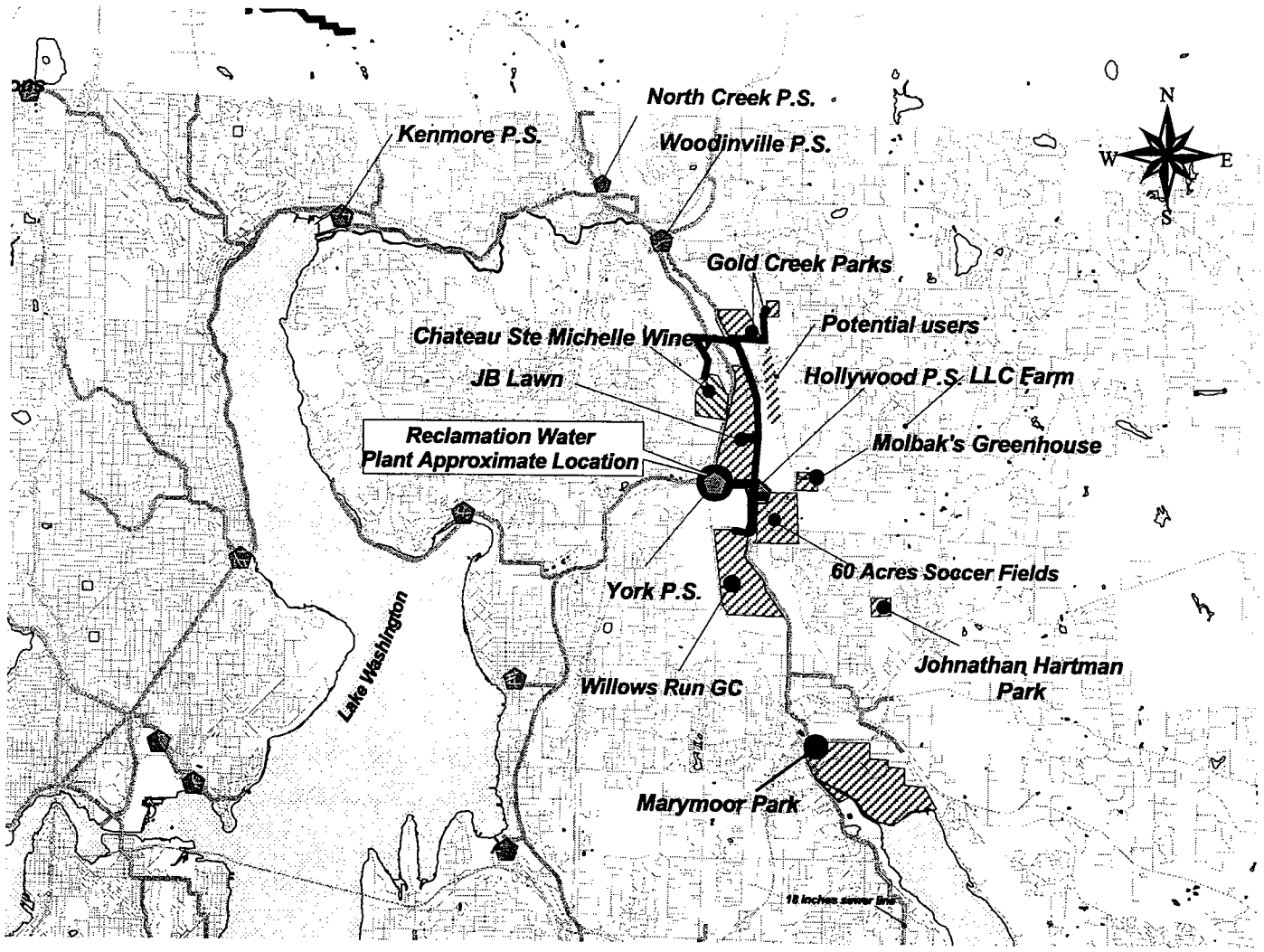
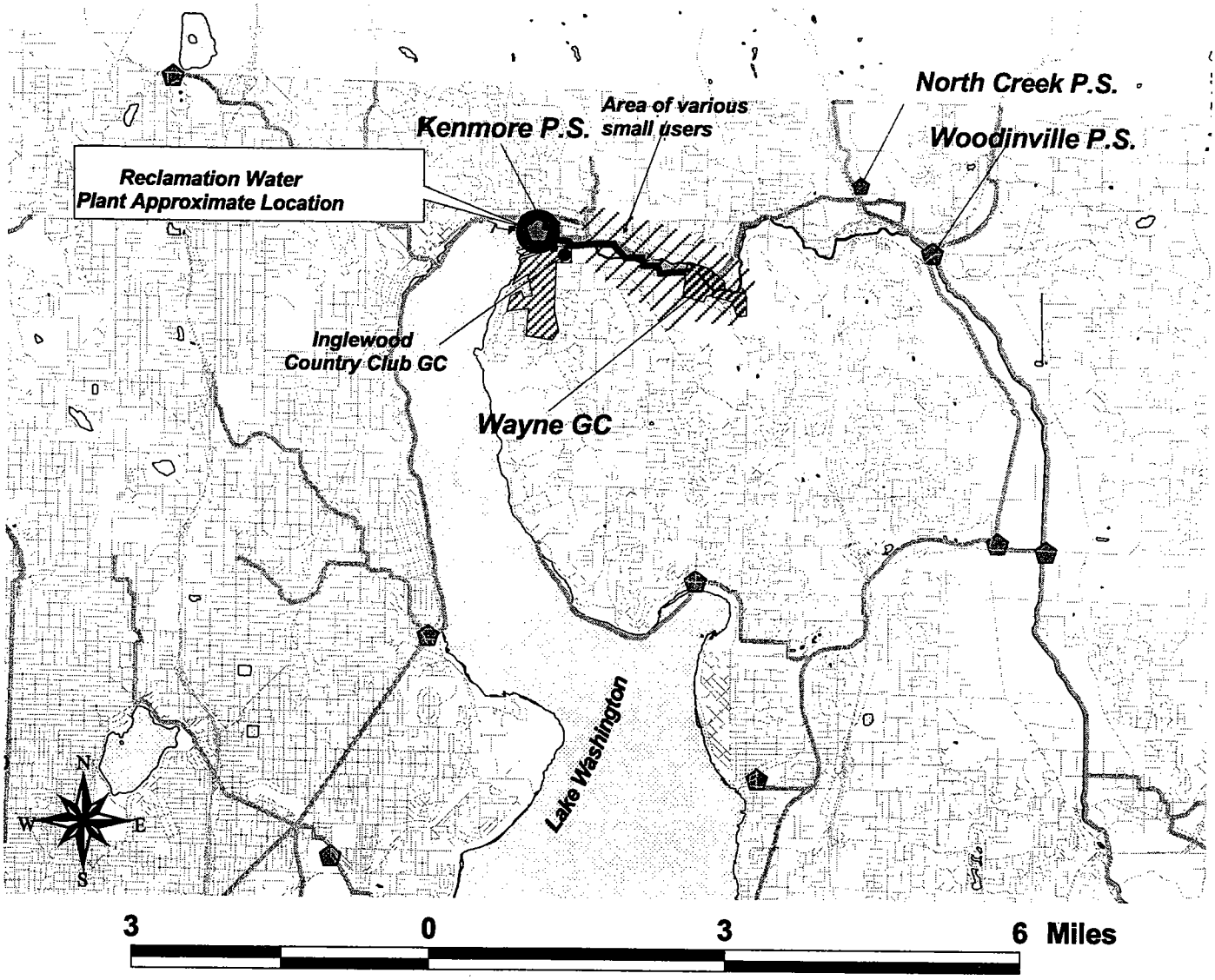


Figure 2

Reclaimed Water Project Evaluation: North Sammamish River



- Pumping Stations
- KC Sewers
- Streets
- Proposed reclamation Water Pipe
- User Area

Figure 3

Reclaimed Water Project Evaluation: Newcastle

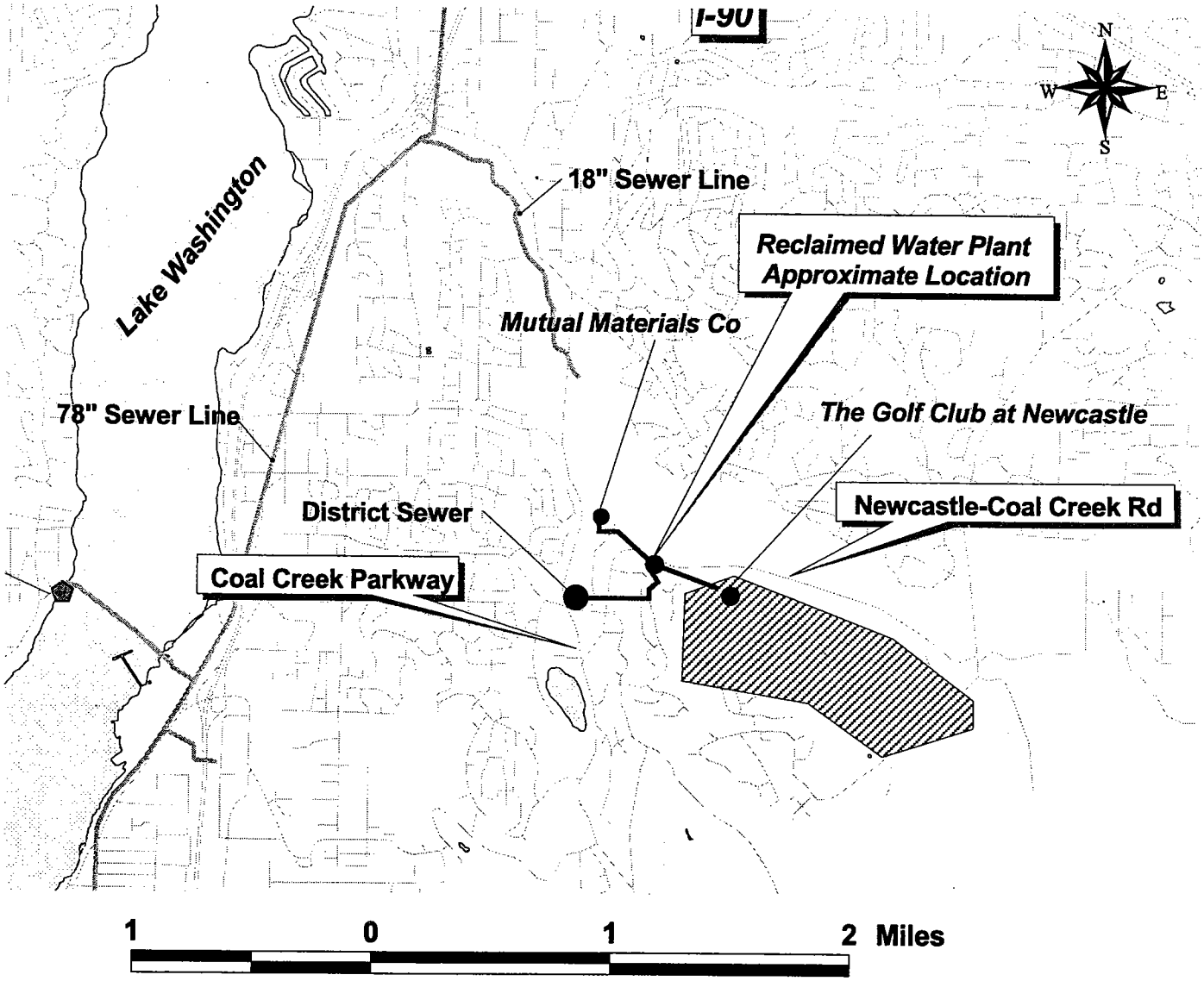
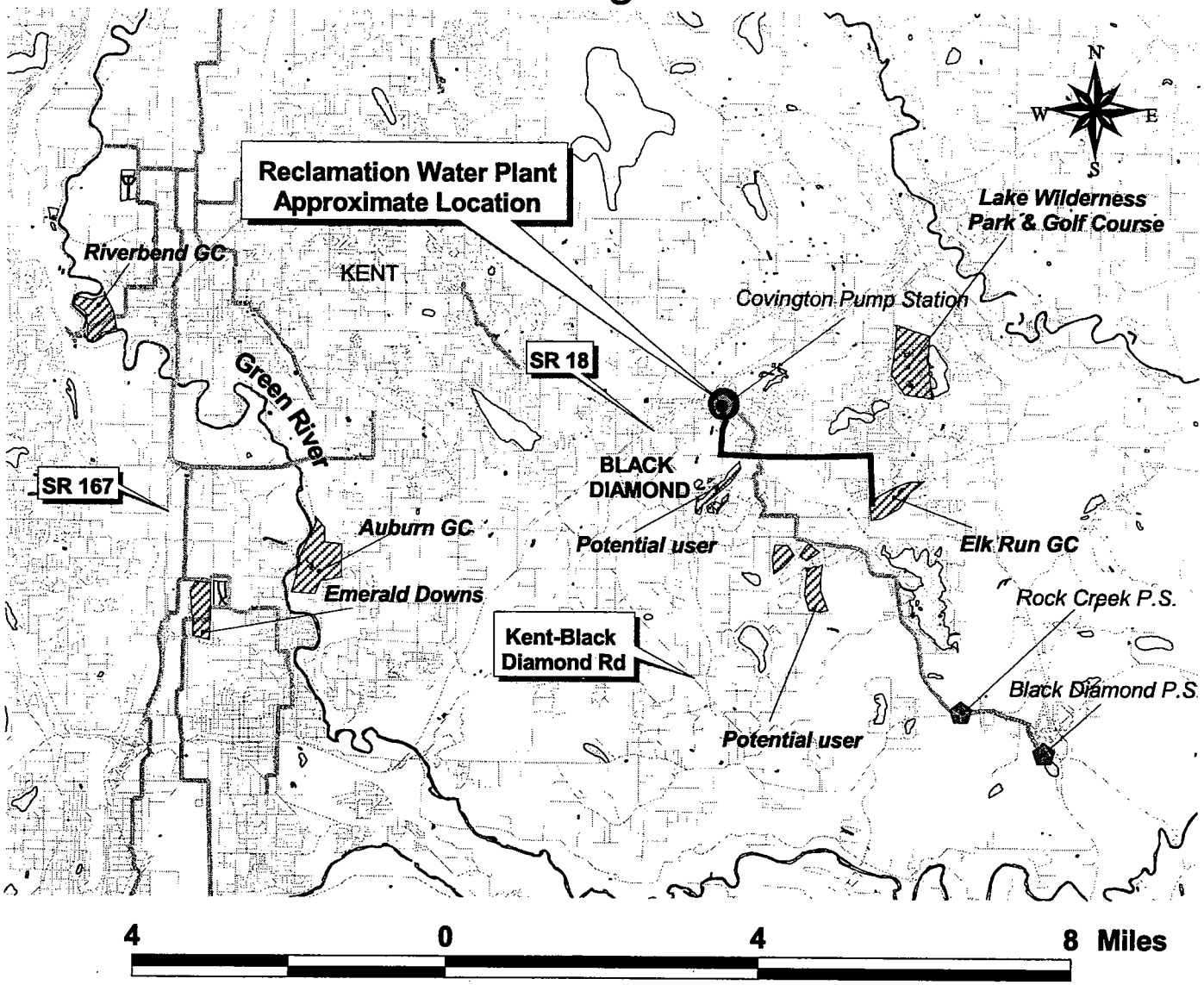


Figure 4

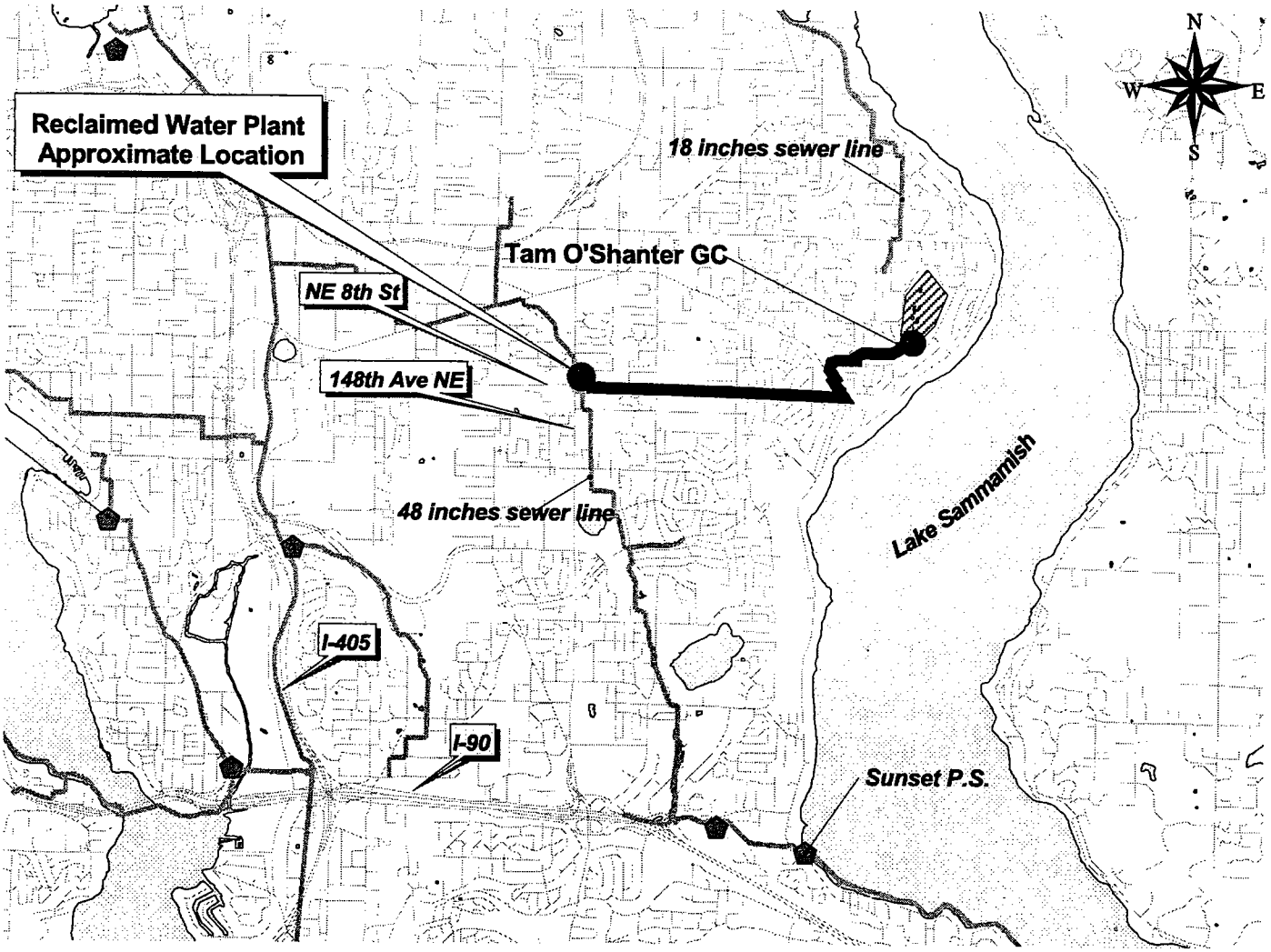
Reclaimed Water Project Evaluation: Covington



- Pumping Stations
- KC Sewers
- Streets
- Proposed reclamation Water Pipe
- User Area

Figure 5

Reclaimed Water Project Evaluation: Tam O'Shanter



Once the initial RFN packages had been reviewed and the five potential projects compiled and developed, a memorandum summarizing the evaluation process and results was sent to each of the RFN applicants. KDCNR then met with a number of the interested RFN applicants to discuss the process and confirm the assumptions that had been made. As a result of the meetings, KCDNR received letters from the Shoreline Water District, Northshore Utility District, and representatives of The Golf Club at Newcastle/Mutual Materials Co. While no changes in the assumptions were required based on the comments from Shoreline Water District or Northshore Utility District, the following modifications were requested and incorporated into the subsequent evaluation for The Golf Club at Newcastle/Mutual Materials Co. project:

- Irrigable acreage to be increased from 100 acres to 190 acres
- The location of the sewer connection relocated to a 16-inch line in the Coal Creek Utility District
- The maximum reclaimed water plant size to be 0.5 mgd; use of the existing 3 MG ponds at the golf course for peak storage
- Water to be provided to Mutual Materials Co. from the 3 MG storage ponds during the 7 months of the year the reclaimed water plant was not operational

Other revisions were also proposed, but not incorporated, because of the need to keep the evaluation process consistent between all the projects to allow comparisons on an equivalent basis.

Cost Evaluation

The final five projects will undergo an evaluation process established to rank the projects and determine which ones should be moved forward to a feasibility analysis stage. The evaluation process will be conducted in accordance with the criteria discussed in the RFN and is detailed in Technical Memorandum 510.

To support the overall evaluation process, each of the five final projects was assessed and compared on a levelized cost basis. The cost estimating tools used to develop project facility costs are described in further detail in Technical Memorandum 330. Although this evaluation focused on determining the best means of providing the necessary treatment and conveyance of reclaimed water to potential users, this evaluation process should be considered preliminary and will be further refined as the final alternatives are further developed.

Design Criteria

To develop comparable alternative costs, a number of assumptions were made regarding potential design criteria. Although these criteria are expected to be further refined in the feasibility analysis stage, preliminary criteria include operating parameters, treatment, and distribution/storage.

Operating Parameters

The most important operating parameter, aside from treatment and distribution/storage, is the operating schedule of the reclamation facilities. Facilities could be operated either seasonally or year-round depending on water demand. Summer irrigation users (e.g., golf courses and parks) dominate the RFN responses and previous KCDNR evaluations of reuse projects, with the exception of The Golf Club at Newcastle/Mutual Materials Co. which has a small (0.005 MGD) year round commercial use application. It was assumed that all of the facilities would operate only during the irrigation season, which was estimated to last 5 months of the year (May–September). However, as stated earlier, representatives of The Golf Club at Newcastle/Mutual Materials Co. propose to use water stored in the 3 MG golf course storage ponds to provide process water to Mutual Materials Co. during the remaining 7 months of the year.

The reclaimed water facilities would draw raw wastewater from the KCDNR sewer system (or Coal Creek Utility District for the Newcastle project) for full-process liquid stream treatment, including biological secondary treatment and tertiary treatment using filtration to prepare Class A reclaimed water suitable for reuse. In this evaluation, wastewater solids derived from satellite secondary and tertiary treatment processes would be reintroduced into the sewer system for conveyance and treatment at KCDNR's regional wastewater treatment plants. The reclaimed water distribution system includes pump stations and pipelines for the conveyance and distribution of reclaimed water to potential users. Where the satellite plant location is sited at a distance from the point of connection to the sewer system, a second pipeline is added to convey the solids collected at the reclaimed water facility back into the sewer line. For this evaluation, the opportunities and benefits for coincident construction with other utility projects have not been included.

Treatment

The treatment criteria for the reclaimed water facilities are determined by the specific applications of reclaimed water. The reclaimed water would be largely used for unrestricted access, irrigation purposes at various parks and golf courses. This use falls under the most stringent reuse criteria set by the Washington State Department of Health (DOH) that requires reclaimed water to be oxidized, filtered, and disinfected (Class A reclaimed water).

It must be noted that this investigation does not examine the benefits or drawbacks of numerous alternative treatment systems able to produce effluent with the desired quality. That analysis will be conducted as the preferred project(s) is/are more fully developed (e.g. predesign phase). Continuous backwashing filters and chlorine disinfection were selected for sizing all tertiary treatment facilities. These unit processes are selected since they are widely used for this application and provide high levels of confidence in their ability to perform well and meet all water quality requirements. This process treatment train, common to all locations investigated, includes filter feed pumping where needed, chemical filter aid addition (alum and polymer dosing), filtration, chlorine dosing, storage, and reclaimed water pumping. Table 3 lists the criteria used to size each unit process.

TABLE 3
Reclamation Facility Tertiary Treatment Sizing Criteria

Factor	Units	Value
Filtration		
Unit filtration rate	gpm/sq ft	3.5
Unit air requirement (@ 20-25 psig)	scfm/sq ft	0.05
Alum dose (min / max)	mg/l	100 / 150
Polymer dose	mg/l	5
Backwash reject rate	gpm/sf	0.16
Chlorine disinfection and residual		
Applied dose concentration	mg/l	5
Residual concentration, minimum	mg/l	0.5

Filters. Continuously-backwashing filters were sized for a continuous 24-hour a day operation at a peak day loading rate of 3.5 gpm/sq ft of filter area. Based on this criteria, a filter feed pumping station was sized for each alternative based on total peak day demand flow requirements. Each filter feed pumping station would consist of at least two vertical turbine pumps (one as an additional pump for backup service and to provide service rotation) to lift treated wastewater to the proper elevation for overcoming the head losses through the filter. To continue with the conservative estimation of treatment requirements, both alum and polymer feed systems were sized for maximum perceived dosages to assist in filtering of solids. Additionally, an alarm system would be installed to warn of failure of electrical power, filter feed pumps, filters, or alum or polymer feed pumps.

Chlorine Disinfection. As required by DOH, chlorine would be injected upstream of the storage tank to provide disinfectant residual in the distribution system. A reclaimed water storage tank would provide contact time and mixing energy for adequate dispersion of chlorine. Chlorine is added in a similar method at the existing KCDNR South Treatment Plant's Reclaimed Water Facility. To meet DOH criteria, a standby chlorine feed system, alarm system, and manifolded chlorine piping, as well as other features, would be installed.

Distribution/Storage

Sizing of each treatment and conveyance unit is normally defined by peak day demand (PDD) and peak hour demand (PHD) determined for each service area. However, it was assumed that golf course users would be able to utilize existing ornamental ponds or other existing storage facilities for storage of reclaimed water. Therefore, the conveyance systems to golf courses were sized for PDD rather than for PHD. When multiple users were present along a distribution line, a combination of PHD and PDD was used for conveying system sizing. Stated another way, golf courses would use their existing ornamental ponds to provide peak hour flows, whereas non-golf course irrigation users would obtain their peak hour flows from the reclaimed water storage and distribution piping systems.

Two options exist for conveying reclaimed water to the usage areas: elevated storage plus gravity conveyance or low head storage plus pumped conveyance. The elevated storage plus gravity conveyance alternative would consist of a pumping station at the treatment

plant delivering the reclaimed water at a rate matching reclaimed water filter production to an elevated storage tank. This tank would be situated at an elevation with enough head to provide adequate irrigation pressures by gravity. Irrigation pressures were based on providing a pressure of 20 psi to the last user on the distribution system. By inspection, economics favor the low head storage plus pumped conveyance mode of distribution. The low head storage alternative evaluated assumes that the storage tank would be located either at the satellite plant or onsite at a large user location (e.g., within a park) to provide PHD to non-golf course users and PDD to golf course users. As stated earlier, it was assumed that golf course users would not need additional onsite storage because ponds with sufficient storage capacity already exist.

The reclaimed water distribution pumping station would operate primarily during the time of irrigation demand (10 hours per day) to supply sufficient pressure for irrigation distribution. The storage tank, which would be sized to offset the differences in peak irrigation demand and reclaimed water production rates, would serve as the wet well for vertical turbine pumps installed above grade. Variable frequency drives would be required for these pumps to reduce the transient effects on the pumps, valves, and piping, and to more precisely meet actual reclaimed water demand. To economically minimize power consumption, conveyance piping was sized so that the total dynamic head would approach 300 to 350 feet per reclaimed water pumping station.

Comparison of Alternatives

As noted earlier, nominations were grouped into five potential projects based on their vicinity to a potential reclaimed water source and the estimated volume of reclaimed water that might be available. The projects are:

- Sammamish River (from Redmond to Woodinville)
- North Sammamish River (Kenmore area)
- The Golf Club at Newcastle and Mutual Materials Co. (south of Bellevue)
- Covington, and
- Tam O'Shanter Golf Course (in Bellevue)

Potential Satellite Plant Locations

Locations of these projects are shown in Figures 1–5. Additional information on the proposed satellite plant locations and anticipated operations issues are provided below.

Sammamish River (York Pumping Station). A reclaimed water plant could be located for the Sammamish River project at the York pumping station (Figure 1). However, the mode of operation of the York pumping station outlined in this document would need to be modified to accommodate the needs of the reclamation water plant. During high winter flows, the York pumping station currently receives wastewater from the 72-inch diameter Lake Sammamish Interceptor. Wastewater flow from the York pumping station is pumped through two force mains (30- inch and 48-inch diameter) that combine into a 72-inch gravity line connected to the Redmond Interceptor. The pumping station operation alternates with the Hollywood pumping station, which is located about 0.5 miles east of the York pumping station, along the Sammamish River. The Hollywood pumping station normally operates during the summer to pump wastewater around the north end of Lake Washington to the West Point Wastewater Treatment Plant. Another diversion system exists at the North

Creek Pumping station (located in the Bothell Quadrant Business Park), which was recently brought online to prevent overflows from the Kenmore Lake line. The North Creek pumping station diverts flow away from the Kenmore Lake line and routes flow back to KCDNR's South Treatment Plant in Renton via the York pumping station and the Eastside Interceptor. This operational mode usually occurs during high winter flows, and the York pumping station does not operate during the dry season. Therefore, to accommodate the needs of a reclamation water plant, the operational philosophy of the Hollywood, York, and possibly North Creek pumping stations would need to be revised. More specifically, both York and Kenmore pumping stations might need to be brought on-line during the dry summer months to provide enough wastewater flow for the reclaimed water facility's operation, as opposed to the current winter-only operational mode. A more detailed evaluation of potential reclaimed water users demand and dry weather flows in the sewer system would determine the extent of operational modifications to the pumping stations.

North Sammamish River (Kenmore Pumping Station). To accommodate water demand on the north end of the Sammamish River, a satellite plant could be constructed in the vicinity of the existing Kenmore pumping station, see Figure 2. Based on current flow information and reclaimed water demand, this satellite plant could serve, as a minimum, two golf courses (Inglewood and Wayne Golf Courses). However, it is anticipated that as the north end of Lake Washington experiences growth, sewer flows will increase and make more water available for reuse, which could be provided to additional users.

The Golf Club at Newcastle and Mutual Materials Co. The RFN for the Newcastle project proposes locating a reclaimed water satellite plant on a parcel adjacent to the Golf Club at Newcastle and owned by OKI Developments. The reclaimed water facility would draw wastewater from a sewer located in the Coal Creek Utility District at manhole D08-16. This connection point was moved in the initial evaluation because there did not appear to be adequate wastewater in the line to support the water reuse project. The connection point was placed at the KCDNR sewer system at the intersection of SE68th and 116th Avenue SE where adequate flows were known to exist. However, the subsequent memo submitted by representatives of the Newcastle project proposed that sufficient flows were available at a 16-inch sewer line located adjacent to the Coal Creek Utility District Operations Center. The information submitted shows that average dry weather flow at this location could accommodate a reclaimed water facility sized for a maximum demand of 0.5 mgd. However, a sensitivity analysis on the assumed conditions of the sewer line (slope and roughness) also shows that average dry weather flows might not be sufficient to provide both the user's reclaimed water demand and avoid solids deposition downstream of the connection to the sewer line. It is understood that if the Newcastle project is selected for the next feasibility assessment phase, accurate flow and sewer information will need to be collected to confirm the potential connection point to the sewer system.

For this preliminary evaluation, the reclamation water facility was sited at the proposed location between the sewer connection and The Golf Club at Newcastle, see Figure 3. The evaluation assumes that reclaimed water would be stored at the golf course to provide the entire non-irrigation period (7 months/year) demand of Mutual Materials and that the satellite plant would only operate 5 months per year, as considered in the other projects. During non-irrigation season operations, it is possible that relatively stagnant water stored in the storage reservoir may suffer an unacceptable degradation in water quality. As a

result, it may be necessary to re-disinfect or otherwise further treat this water prior to delivery to Mutual Materials Co.

Covington (Covington Pumping Station). The Covington Water District expressed interest in constructing a satellite plant in the vicinity of the Covington pumping station, downstream of the Black Diamond pumping station, see Figure 4. From the information contained in the RFN package, a reclamation water treatment plant would need to be sized for 0.5 MGD (for peak day demands). However, average dry weather flows at both the Covington and the Black Diamond pumping stations are below 0.5 MGD[1] and would not provide enough water to accommodate the current demand. Constructing a satellite plant at the Covington pumping station could be reevaluated as the Black Diamond/Covington area experiences growth and as wastewater flows in the sewer system increase. Otherwise, an alternate location that would give immediate access to more wastewater could be selected in the vicinity of the Green River and the Auburn Interceptor. This alternate location would add substantial costs due to additional pipeline length, but other potentially large users such as golf courses, particularly in the Auburn Valley, could be added to increase the reclaimed water utilized (and plant capacity) and reduce the levelized unit costs of the reclaimed water. Some version of a modified project could be considered in a future evaluation.

Tam O'Shanter Golf Course. The Tam O'Shanter Golf Course is located on 183rd Avenue NE, near the west side of Lake Sammamish. The closest sewer line that could provide enough wastewater flow for reuse is located about 2 miles to the west (the 48-inch diameter Lake Hills interceptor). Although there is an 18-inch diameter sewer line approximately 1,500 feet to the northeast of the golf course, the existing information indicates that wastewater flow is not sufficient to allow reclaimed water to be provided to the golf course. A reclaimed water satellite facility near 148th Ave SE and NE 8th St. was evaluated for the Tam O'Shanter project.

Maximum Available Wastewater Flows for Reclamation

A comparison between user demands and available wastewater flows in the sewer system gives a first indication of facilities sizing. The two following criteria were used to determine the maximum available flow in the existing sewer system, suitable for reclaimed water production:

- Average dry weather flow available in the sewers, and
- A minimum carrying velocity of 2.5 feet per second (fps) for solids conveyance within the sewer system.

Irrigation occurs during dry weather, usually between May and September. Wastewater would be diverted from the sewer system to the reclamation water treatment plant in quantities to meet the user demands. This diversion could cause solids deposition within the sewer system downstream if a minimum velocity is not maintained in the conveying pipe. It is generally accepted that the minimum velocity should be at least 2.5 fps to ensure solids conveyance. The minimal flow requirement in the sewer line downstream of the

[1] From Metro's Offsite Facilities and Miscellaneous Structures Manual, Volume 1, East Division, Revision B, December 1994, and from data compiled by Brown and Caldwell for other projects.

diversion point is determined from this minimal velocity and the sewer line geometry. Since the filter system operates 24 hours per day, the maximum amount of wastewater available for reuse is estimated from the minimal flow needed for solids conveyance and the average dry weather flow available in the sewer line.

Maximum available flows were determined for the five potential plant locations and are presented in Table 4. Unless otherwise indicated, diameter, slope and flow information in Table 4 were obtained through KCDNR's sewer database[2]. To be conservative, flow information given was interpreted as annual average flow, to which a factor of 80 percent was applied to account for dry weather flow. Flow was calculated using Manning's equation applied to partially full pipes, with a roughness coefficient of 0.013.

TABLE 4.
Maximum Currently Available Flow for Reclamation Water[a]

Satellite Plant	Minimum Downstr. Velocity[b] (fps)	Slope (vft/hft)	Line Diameter (inch)	Minimum Flow Needed[b] (MGD)	Avg. Dry Weather Flow (MGD)	Maximum Amount Available (MGD)	Reclaimed Water PDD (MGD)
York Pumping Station (*Sammamish River*)	2.5	0.001	72	4.4	6.5[d,e]	2.1	4.4
					9.5[f,g]	5.1	4.53
Kenmore Pumping Station (*North Sammamish River*)	2.5	0.001	48	3.7	8.0[h]	1.3[i]	1.32
OKI Developments land parcel (*Newcastle*)	2.5	0.005[c]	16[c]	0.37	0.9[c]	0.53	0.5[c]
SR 167 & S259th St (*Covington*)	2.5	0.001	15	0.4	0.4-0.[j]	<0.4	0.5
148th Ave NE & NE 8th St (*Tam O'Shanter*)	2.5	0.002	48	1.6	4.[h]	2.4	0.44

[a]Unless otherwise noted, pipe diameter, slope and flows : King County GIS Technical Resource Center CD-Rom#7 Standard database shapefiles, October 1997.

[b]As determined for solids conveyance. Based on Manning's roughness coefficient of 0.013.

[c] Pipe and flow information submitted by the representatives for The Golf Club at Newcastle.

[d]Assuming that during dry weather season, wastewater would be diverted from the Sammamish Valley Interceptor to the York pumping station (usually out of service during dry season) for reclamation water purposes.

[e]Dry weather base flow at the Hollywood pumping station (communication with Bob Swarner, King County, March 24, 2000).

[f]Assuming that flow would be diverted both from the Hollywood pumping station (6.5 MGD base flow) and the North Creek pumping station (3 MGD base flow).

[g]Flow information from communication with Bob Swarner, King County, March 2000.

[h] Dry weather flow estimated by using 80% of average annual flow.

[i] Assuming that 3 MGD is diverted from the North Sammamish interceptor for the operation of the York reclaimed water facility (e.g. ADWF – diverted flow – minimum flow for solids conveyance downstream = max available flow) (see note d).

[j]Flow information based on the King County Offsite Facilities and Miscellaneous Structures, Volume 1, East Division, and on King County sewer basins information compiled by Brown and Caldwell.

The data in Table 4 indicate that it is necessary to divert flow from the Hollywood pumping station (6.5 MGD) and the North Creek pumping station (3.0 MGD) during the summer to accommodate the needs of a reclamation water treatment plant located at the York pumping

[2] King County GIS Technical Resource Center CD-Rom#7 Standard database shapefiles, October 1997.

station. It is anticipated that growth in the Sammamish Valley would generate base flows of 7 to 8 MGD at the Hollywood pumping station in the year 2010,by which time diversions from the North Creek pumping station would no longer be required. Cost estimates have been developed for a facility of 4.5 MGD to accommodate users along the Sammamish River from Willows Run Golf Course north to Gold Creek Parks. All the other facilities evaluated have enough current flows available for user demands and would be sized accordingly, with the exception of Covington, which was discussed previously.

Potential Reclaimed Water Demands

Table 5 lists the users identified for this evaluation, the potential locations for a satellite treatment plant, and estimated water demands for each user. Water demand for a number of users was not available; the operating conditions used to size and evaluate each facility were estimated through peaking factors and data from other users. The sources used to estimate values in Table 5 were obtained from data provided in the RFN packages, a previous planning document (CH2M HILL, *November 1993*), and State of Washington Irrigation Guide for agronomic rates. Those assumptions are described earlier in this memorandum and will be revised as the evaluation is further refined.

In some cases, a range of values are presented representing RFN data and figures based on the estimated agronomic rates. One factor contributing to the demand uncertainty is that the summer of 1999 was unusually wet; therefore, monthly consumption rates provided by users in the RFN are believed to be low. Washington State agronomic data indicates that an 18-hole golf course (which generally covers about 100-120 acres) in the Puget Sound region typically requires an average of 0.43 MGD of water throughout the summer (this volume is equivalent to a peak day demand of 0.66 MGD). For those golf courses that provided specific 1999 water usage that appeared to be biased low, an average value between the user-provided volume and the agronomic estimate was used to better reflect more typical water consumption. In addition, the Golf Club at Newcastle has estimated its irrigation water demand, combined with the demand of Mutual Materials Co., at 0.5 mgd and has requested that the facilities be sized for this flow. However, it should be noted that since the irrigable acreage of the golf course was given as 190 acres, agronomic rates would indicate that average water demand would be 0.8 mgd and peak month demands would be 1.24 mgd. The existing 3 MG of storage at the golf course is not adequate to meet the summer reclaimed water irrigation demands. Therefore, it is believed that a peak day demand of 0.5 mgd underestimates the total demand for irrigation water and additional water sources will be required to meet irrigation needs.

Average consumption rates for other large sites for which specific consumption information was not available were based solely on agronomic rates for the estimated irrigated acreage.

For those sites with continuous demand (e.g., Molbaks), the average annual demand provided by each users was converted to average seasonal daily demands and scaled to reflect five months of use because the reclamation facility would be online only between May-September.

If estimated peak day demands were not provided in the RFN packages, then peak day demands were calculated using a peaking factor from the agronomic data set. These data indicate that for seasonal irrigation use, the peak month demands are equivalent to 1.54 of

the average month demands. In the absence of more specific information, peak day demands were assumed to be equivalent to peak month demands. For those facilities without onsite storage (i.e., all non-golf course sites), peak hour demands were also used to determine the appropriate pipeline sizing. A typical peaking factor of 2.4 was used, representing 10 hours of irrigation within a 24-hour day.

TABLE 5.
Reclaimed Water Flow Demand

Potential Satellite Plant Location	Potential Users	Average day[a] (MGD)			PDD[b] (MGD)	PHD[c] (gpm)
		min	max	Avg		
York Pumping Station (*Sammamish River*)						
	Willows Run Golf Course	0.332	1.283	0.808	1.27	2,198
	Farm LCC			0.201	0.31	516
	60 Acres Soccer Field			0.171	0.26	439
	Molbak's Greenhouse			0.026	0.04	67
	JB Instant Lawns			1.072	1.65	2,751
	Hmong Farm			0.201	0.31	516
	Chateau Ste. Michelle Winery			0.342	0.53	878
	Gold Creek Parks			0.107	0.16	274
Kenmore Pumping Station (*North Sammamish River*))						
	Wayne GC			0.427	0.66	1,100
	Inglewood Country Club			0.427	0.66	1,100
OKI Developments land parcel (*Newcastle*)						
	The Golf Club at Newcastle/Mutual Materials Co.			0.5[d]	0.5[d]	833
Covington Pumping Station (*Covington*)						
	Covington Water District			0.5[e]	0.5[f]	833
148th Ave NE & NE 8th St (*Tam O'Shanter*)						
	Tam O'Shanter Golf Course	0.150	0.427	0.289	0.44	741

[a] During irrigation period (May-September)
[b] Peak day demands (PDD) are based on applying a 1.54 peaking factor to the average value of average day demand. Peaking factor calculated based on agronomic rates.
[c] Assuming a peaking factor of 2.4. PHD/PDD based on assumption of 10 hours irrigation per day.
[d] Provided by representatives for The Golf Club at Newcastle
[e] Based on RFN information, it is estimated that the Covington average demand will be at least 0.5 mgd.
[f] Provided by the Covington Water District RFN

Reclamation Facilities Design Flow Criteria

Upon development of the reclaimed water flow demand, the design flow criteria for the reclaimed water treatment, storage, and transmission piping facilities was estimated. General economic and engineering practice suggests that oversized buried conveyance piping be installed in the initial phase of construction to account for future flow demand. For the purpose of this evaluation, treatment, storage, and conveyance facilities were based on flow demands listed in Table 5 and do not allow for expansion, with the exception of the Sammamish River project, for which the distribution system was sized to allow potential expansion to add Marymoor Park as a user. Additional investigation is needed to confirm all current and future flow demands.

A summary of reclamation facilities design flow criteria is presented in Table 6. This table shows the basic flow design data to be used for this investigation for reclamation treatment, storage, pumping, and transmission.

TABLE 6.
Summary of Reclamation Facilities Design Criteria

Satellite Plant	Design Flow for Secondary and Tertiary Treatment (MGD)	Total Reclaimed Water Storage[a] (MG)
York Pumping Station (*Sammamish* River)	4.53	2.7
Kenmore Pumping Station (North *Sammamish River*)	1.32	0.0
OKI Developments land parcel (*Newcastle*)	0.5	3.0[b]
Covington Pumping Station (*Covington*)	0.5	0.0
148th Ave NE & NE 8th St (*Tam O'Shanter*)	0.44	0.0

[a]Assuming that existing ornamental ponds would be used for storage at golf course locations. Storage is provided for non golf course users only at the satellite plant location.
[b] Existing storage is available at the golf course and proposed to be used for summer irrigation as well as the year round demands of Mutual Materials Co.

Estimated Costs

The method followed for cost estimation has been previously described in the 1995 feasibility study previously prepared for KCDNR (ECONorthwest, et al; 1995) and KCDNR's *Regional Wastewater Services Plan*. For the purposes of this evaluation, capital costs and annual operations and maintenance (O&M) costs were based on the data compiled in these reports, which evaluated satellite treatment plant capacities between 0.1 and 10 MGD. Those data have been interpolated to get the appropriate costs to the projects investigated here. Finally, the costs have been corrected with the ENR indexes for October 1995 and February 2000. Costing methodology is described in more detail in Technical Memorandum 330.

Cost analyses were performed for each alternative following the method outlined in Technical Memorandum 330. Table 7 lists the project capital costs for each alternative based on distribution, secondary treatment, and tertiary treatment facilities.

TABLE 7
Project Capital Costs, Year 2000[a]

Item	Sammamish River[b]	North Sammamish River[b]	Newcastle	Covington[b]	Tam O'Shanter
Reclamation Plant Design Capacity (MGD)	4.53	1.32	0.5	0.5	0.44
Distribution System	$9,370,000	$1,906,000	$1,054,000	$2,457,000	$1,858,000
Secondary Treatment	$26,685,000	$11,809,000	$6,937,000	$6,433,000	$6,937,000
Tertiary Treatment	$7,507,000	$3,756,000	$2,234,000	$2,234,000	$2,234,000
Total	**$43,562,000**	**$17,471,000**	**$10,225,000**	**$11,124,000**	**$11,029,000**

[a]Includes Contingency (25%), Sales tax (8.6%), Engr/Admin/Legal (35%).
[b] Assumes the use of existing pumping station equipment.

Annual operation and maintenance costs for each alternative are listed in Table 8.

TABLE 8
Operation and Maintenance Costs, Year 2000[a]

Item	Sammamish River	North Sammamish River	Newcastle	Covington	Tam O'Shanter
Reclamation Plant Design Capacity (MGD)	4.53	1.32	0.5	0.5	0.44
Distribution System [b] ($/year)	$70,000	$26,000	$32,000	$23,000	$23,000
Secondary Treatment ($/year)[d]	$266,000	$94,000	$65,000	$65,000	$49,000
Tertiary Treatment [c] ($/year)	$216,000	$121,000	$78,000	$78,000	$69,000
Total Annual O&M ($/year)[d]	**$552,000**	**$241,000**	**$175,000**	**$166,000**	**$141,000**

[a] Based on average irrigation demand over five months of operation per year
[b] Includes pipe and pump maintenance costs, power based on 75% efficiency, and storage tank maintenance costs
[c] Includes chemical costs, maintenance and power costs (pump efficiency @ 75%)
[d] Includes lift station maintenance and power costs

The unit cost of producing reclaimed water is presented in Table 9 in dollars per hundred cubic feet ($/ccf). Based on this comparison, the cost per hundred cubic foot varies between $4.01 and $10.33. The estimated distribution length and seasonal operation (5 months per year) of the facilities have a large impact on these unit costs.

TABLE 9
Levelized Unit Costs

Item	Sammamish River	North Sammamish River	Newcastle	Covington[d]	Tam O'Shanter
Levelized Unit Cost[a] ($/ccf)	$4.01[b]	$5.65[c]	$5.98	$6.26	$10.33

[a] Levelized unit cost is obtained from the ratio of the total of the equivalent annual costs over a 35-year cycle divided by the total ccf of reclaimed water produced over the cycle. The equivalent annual cost includes O&M costs, salvage value, and capital recovery payments, annualized with a 3 % discount rate factor and 6.25 % interest rate. The salvage value is estimated on static facilities (80% of distribution and 50% of treatment equipment), using straight line depreciation over 75 years.
[b] Assumes the use of the existing York pumping station equipment. If a new package lift station were constructed, the levelized costs would be $4.17/ccf.
[c] Assumes the use of the existing Kenmore pumping station equipment. If a new package lift station were constructed, the levelized costs would be $5.89/ccf.
[d] Assumes the use of the existing Covington pumping station equipment. If a new package lift station were constructed, the levelized costs would be $6.47/ccf.

As a means of comparison and to put the reclaimed water unit cost into perspective, Table 10 presents the water rates of the utilities that supply potable water to customers within or near each of the water reuse project areas. Listed are the rates that would be charged for large irrigation users in 2000.

TABLE 10
Potable Water Rates

	City of Redmond	Woodinville Water District	Northshore Utility District	Covington Water District	City of Bellevue	Coal Creek Utility District
Unit Cost ($/ccf)	$2.04	$4.00	$3.20	$4.28	$3.51	$3.22

Attachment 2: Cost Estimating Spreadsheets

RECLAIMED WATER ASSISTANCE PROGRAM

TASK 4.20 - DISTRIBUTION SYSTEM COSTS - CONSTRUCTION COSTS
Includes pumps and pipeline from the the satellite plant to the user

Project	Pipe Routing	Plant capacity MGD	Piping length L (ft)	Pump Station costs: Flow for Pipe sizing[c] MGD	D inches	v ft/sec	Manning's n	Manning's friction loss Hf (ft)	static head ft	Delivered P requ'd ft	TDH ft	Base pump sta. constr, $[d,e,f]	Mob/ Demob, 0%, $	Contin-gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Total pump sta. constr cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $
Tam O'Shanter	to Tam O'Shanter	0.44	12,000	0.44	8	1.95	0.010	**23**	200	20	243	198,000	0	49,500	0	21,285	268,785	94,075	362,860
NewCastle	From Manhole to Satellite Plant	0.5	2,600	0.497	8	2.21	0.010	**6**	110	20	136	80,000	0	40,000	0	17,200	217,200	76,020	293,220
	From Satellite Plant to NewCastle GC		1,000	0.497	8	2.21	0.010	**2**	210	20	232	80,000							
	From Satellite plant to Manhole (solids back to sewer)[b]		2,600	0.050	4	0.89	0.010	**3**	n.a.										
	From Satellite plant to Mutual Materials		1,700	0.003	2	0.21	0.010	**0**	n.a.										
Sammamish River[a]	Total, from York to Hollywood	4.53	2,500	10.29	18	9.03	0.010	**34**	20	20	206	1,100,000	0	275,000	0	118,250	1,493,250	522,638	2,015,888
(without oversizing to North,	Molbak's pipe		3,700	0.10	4	1.78	0.010	15											
and oversizing to South to serve	60 Acres' pipe		700	0.63	6	4.98	0.010	13											
Marymoor in future)	from Hollywood to Willows Run GC		3,000	2.47	8	10.97	0.010	178											
	Willows Run		1,500	1.27	8	5.64	0.010	24											
	from Hollywood to JB Lawn		3,000	7.09	16	7.87	0.010	**36**											
	from JB Lawn to Ste.Michelle/Gold Creek split		5,200	3.13	14	4.54	0.010	**25**											
	Ste.Michelle's pipe (West)		4,500	1.27	8	5.64	0.010	**71**											
	Gold Creek Parks' pipe (East)		3,800	1.86	10	5.29	0.010	39											
North Sammamish River	Total, from Kenmore P.S. to Inglewood GC	1.32	900	1.32	8	5.86	0.010	**15**	20	20	217	411,000	0	102,750	0	44,183	557,933	195,276	753,209
(Kenmore pumping station)	to Wayne GC		8,200	0.66	6	5.21	0.010	**161**											
Covington	Total	0.5	17,100	0.50	8	2.22	0.010	**42**	90	20	152	198,000	0	49,500	0	21,285	268,785	94,075	362,860

a.The reclaimed water produced is distributed to multiple users; distribution line costs are calculated for various section and added to give total cost.

b. It is assumed that solids are returned via gravity back to the original sewer line through a 4-inch pipe. This 4-inch pipe is assumed to be installed in a common trench with the pipe carrying the sewage to the satellite plant. Due to common trench benefits, the costs for installing this 4-inch line were estimated to be 50% of the costs for a single line.

c. Distribution lines are sized to provide peak hour demand to non golf course users and peak day demand to golf course users.

d. The satellite plant is located at an intermediate elevation between the sewer connection and the golf course (sewer connection: el 380, satellite plant: el 490, golf course pond: el 700); the estimate accounts for two lift stations. Flow from the storage ponds to Mutual Materials Co is assumed to be gravity via the same pipeline that serves Newcaslte for nigth irrigation.

e. Assumes that Newcastle GC has enough storage to provide reclaimed water for Mutual Materials' demand during the total non-irrigation period (7 months) and that the satellite plant does not operate during non-irrigation period; Also assumes that usual rainfall will make up for the water taken out of the ponds.

f. Pump station costs for the Newcastle project at 0.5 mgd design flow are lower than those for other 0.5 mgd projects due to shorter (< 10,000 ft) distribution distances

g. It is assumed that storage is not necessary at golf course locations where existing ponds can be used for reclamation water storage.

h. ENR Sept-1995, Seattle area, construction =5800

i. ENR Feb-2000, Seattle area, construction = 7151

Mob/Demob=	0.0%
Contingency =	25.0%
Sales tax =	8.6%
ELA =	35.0%
Contractor O&P=	0.0%

TASK 4.20 - DISTRIBUTION SYSTEM COSTS - CONSTRUCTION COSTS
Includes pumps and pipeline from the the satellite plant to the user

	Pipeline construction costs									Storage construction costs[g]										
Project	pipeline unit cost, $/lf	base pipe constr cost, $	Mob/ Demob, 0%, $	Contin-gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Total pipeline constr cost,$	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Irrigation storage vol, MG	base storage tank constr cost, $	Mob/ Demob, 0%, $	Contin-gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Storage tank construction cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Total Project cost in 1995 $	After ENR Indexation[h,i] in $ 2000
Tam O'Shanter	52	624,000	0	156,000	0	67,080	847,080	296,478	1,143,558	0	0	0	0	0	0	0	0	0	1,506,418	$ 1,858,000
NewCastle	52	135,200	0	76,600	0	32,938	415,938	145,578	561,516	0	0	0	0	0	0	0	0	0	854,736	$ 1,054,000
	52	52,000																		
	21	54,600																		
	38	64,600																		
Sammamish River[a]	87	217,500	0	424,150	0	182,385	2,303,135	806,097	3,109,232	2.7	1,350,000	0	337,500	0	145,125	1,832,625	641,419	2,474,044	7,599,163	$ 9,370,000
(without oversizing to North,	42	155,400																		
and oversizing to South to serve	47	32,900																		
Marymoor in future)	52	156,000																		
	52	78,000																		
	79	237,000																		
	71	369,200																		
	52	234,000																		
	57	216,600																		
North Sammamish River	52	46,800	0	108,050	0	46,462	586,712	205,349	792,061	0.00	0	0	0	0	0	0	0	0	1,545,269	$ 1,906,000
(Kenmore pumping station)	47	385,400																		
Covington	52	889,200	0	222,300	0	95,589	1,207,089	422,481	1,629,570	0.0	0	0	0	0	0	0	0	0	1,992,430	$ 2,457,000

RECLAIMED WATER ASSISTANCE PROGRAM

TASK 4.20 - DISTRIBUTION SYSTEM COSTS - ANNUAL O&M COSTS

			ANNUAL PUMPING STATION O&M COSTS[a]														ANNUAL PIPELINE O&Ma		ANNUAL STORAGE O&M[b]		Total annual	After
Project	Average volume MGD	Total Piping L (ft)	Total pump sta. construction costs, $	annual pump maintenance costs, 1995 US$	TDH ft	overall pump efficiency, %	annual power req's @ peak flow, kw-hr	annual pump usage, %[a]	actual annual power req's, kw-hr	cost per kw-hr, $	annual pump power cost, 1995 US$	peak flow annual labor req's, hrs	annual usage %[a]	actual annual labor, hrs	labor cost $/hr	annual pump O&M labor cost, $	Total annual pump O&M costs, $	Total pipeline construction costs, $	annual pipe maintenance costs, 1995 US$	Storage tank Construction costs, $	annual storage tank maint. costs, $	distribution system O&M costs, $/year	ENR Cost Indexation[c,d] $2,000
Tam O'Shanter	0.289	12,000	268,785	1,344	243	75%	107,188	42%	45,019	0.034	1,531	500	42%	210	45	9,450	12,325	847,080	4,235	0	0	16,560	$ 23,000
NewCastle	0.5	7,900	217,200	1,086	369	75%	281,782	42%	117,503	0.034	3,995	1,000	42%	417	45	18,765	23,846	415,938	2,080	0	0	25,926	$ 32,000
Sammamish River	2.928	27,900	1,493,250	7,466	206	75%	923,330	42%	385,029	0.034	13,091	800	42%	334	45	15,012	35,569	2,303,135	11,516	1,832,625	9,163	56,248	$ 70,000
North Sammamish River	0.854	9,100	557,933	2,790	217	75%	282,750	42%	117,907	0.034	4,009	600	42%	252	45	11,340	18,138	586,712	2,934	0	0	21,072	$ 26,000
Covington	0.5	17,100	268,785	1,344	152	75%	115,895	42%	48,328	0.034	1,643	500	42%	209	45	9,383	12,370	1,207,089	6,035	0	0	18,405	$ 23,000

a. Assumes irrigation operations 5 months/year, Mutual Materials (Newcastle project) is gravity-fed from the Newcaslte golf course storage ponds.
b. It is assumed that storage is not necessary at golf course locations where existing ponds can be used for reclamation water storage.
c. ENR Sept-1995, Seattle area, construction =5800
d. ENR Feb-2000, Seattle area, construction = 7151

TASK 4.20 - TERTIARY TREATMENT CAPITAL COSTS
CLASS A RECLAIMED WATER TREATMENT SYSTEM

		FILTER CHEMICAL FEED SYSTEM			FILTER FEED PUMPS											FILTERS									
Project	Plant capacity MGD	Alum/polymer feed syst. constr cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Friction head loss, ft	static head ft	TDH ft	Base pump sta. constr, $	Mob/ Demob, 0%, $	Contin-gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Total feed pumps constr cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Filter loading rate gpm/sf	Filter surface area, sf	Base filter constr. cost, $	Mob/ Demob, 0%, $	Contin-gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Total filter constr cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $
Tam O'Shanter	0.44	405,000	141,750	546,750	10	20	30	45,000	0	11,250	0	4,838	61,088	21,381	82,468	3.5	87	405,000	0	101,250	0	43,538	549,788	192,426	742,213
NewCastle	0.5	405,000	141,750	546,750	10	20	30	45,000	0	11,250	0	4,838	61,088	21,381	82,468	3.5	99	405,000	0	101,250	0	43,538	549,788	192,426	742,213
Sammamish River	4.53	690,000	241,500	931,500	10	20	30	212,000	0	53,000	0	22,790	287,790	100,727	388,517	3.5	899	2,160,000	0	540,000	0	232,200	2,932,200	1,026,270	3,958,470
North Sammamish River	1.32	675,000	236,250	911,250	10	20	30	90,000	0	22,500	0	9,675	122,175	42,761	164,936	3.5	262	766,000	0	191,500	0	82,345	1,039,845	363,946	1,403,791
Covington	0.5	405,000	141,750	546,750	10	20	30	45,000	0	11,250	0	4,838	61,088	21,381	82,468	3.5	99	405,000	0	101,250	0	43,538	549,788	192,426	742,213

a. ENR Sept-1995, Seattle area, construction =5800
b. ENR Feb-2000, Seattle area, construction = 7151

TASK 4.20 - TERTIARY TREATMENT CAPITAL COSTS
CLASS A RECLAIMED WATER TREATMENT SYSTEM

	CHLORINATION SYSTEM CONSTRUCTION COST											CHLORINE TANK CONSTRUCTION COSTS											
Project	Chlorine dosage, mg/l	Chlorine peak use, lbs/day	Cl system base constr cost, $	Mob/ Demob, 0%, $	Contin- gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Cl system cost w/o UFC upgrade	Cl system cost w/UFC upgrade, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Cl tank det. time, min	Cl tank vol, cf	Cl tank base constr cost, $	Mob/ Demob, 0%, $	Contin- gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Total Cl tank cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Total Project Cost, $	After ENR Cost Indexation[a,b] $2,000
Tam O'Shanter	5	18	68,000	0	17,000	0	7,310	92,310	184,620	64,617	249,237	35	1,429	104,000	0	26,000	0	11,180	141,180	49,413	190,593	1,811,261	$ 2,234,000
NewCastle	5	21	68,000	0	17,000	0	7,310	92,310	184,620	64,617	249,237	35	1,624	104,000	0	26,000	0	11,180	141,180	49,413	190,593	1,811,261	$ 2,234,000
Sammamish River	5	189	86,000	0	21,500	0	9,245	116,745	233,490	81,722	315,212	35	14,717	270,000	0	67,500	0	29,025	366,525	128,284	494,809	6,088,507	$ 7,507,000
North Sammamish River	5	55	78,000	0	19,500	0	8,385	105,885	211,770	74,120	285,890	35	4,288	153,000	0	38,250	0	16,448	207,698	72,694	280,392	3,046,258	$ 3,756,000
Covington	5	21	68,000	0	17,000	0	7,310	92,310	184,620	64,617	249,237	35	1,624	104,000	0	26,000	0	11,180	141,180	49,413	190,593	1,811,261	$ 2,234,000

TASK 4.20 - TERTIARY TREATMENT O&M COSTS
CLASS A RECLAIMED WATER TREATMENT SYSTEM

		ALUM CHEMICAL COSTS[a]						POLYMER CHEMICAL COSTS[a]						ALUM/POLYMER FEED SYSTEM POWER				ALUM/POLYMER O&M		**TOTAL**	FILTER O&M	
Project	Average capacity MGD	Alum dosage, mg/l	Alum use, lbs/day	Annual use, %	Annual vol, tons	Alum cost, $/ton	Annual alum cost, $	Polymer dosage, mg/l	Polymer use, lbs/day	Annual use, %	Annual vol, tons	Polymer cost, $/ton	Annual Polymer cost, $	alum/polymer feed power req's, hp	annual power req's kw-hr	cost per kw-hr, $	annual pump power cost, $	Alim/polymer feed syst. const cost,$	O&M costs, $	ALUM/ POLYMER O&M, $	Total Filter const cost, $	O&M costs, $
Tam O'Shanter	0.289	150	362	42%	28	140	3,855	0.5	1.21	42%	0.09	4,000	367	2.5	16,286	0.034	554	405,000	2,025	6,801	549,788	2,749
NewCastle	0.5	150	626	42%	48	140	6,669	0.5	2.09	42%	0.16	4,000	635	2.5	16,286	0.034	554	405,000	2,025	9,883	549,788	2,749
Sammamish River	2.928	150	3666	42%	279	140	39,054	0.5	12.22	42%	0.93	4,000	3,719	2.5	16,286	0.034	554	690,000	3,450	46,777	2,932,200	14,661
North Sammamish River	0.854	150	1069	42%	81	140	11,391	0.5	3.56	42%	0.27	4,000	1,085	2.5	16,286	0.034	554	675,000	3,375	16,404	1,039,845	5,199
Covington	0.5	150	626	42%	48	140	6,669	0.5	2.09	42%	0.16	4,000	635	2.5	16,286	0.034	554	405,000	2,025	9,883	549,788	2,749

a. Assumes irrigation operations 5 months/year.
b. ENR Sept-1995, Seattle area, construction =5800
c. ENR Feb-2000, Seattle area, construction = 7151

TASK 4.20 - TERTIARY TREATMENT O&M COSTS
CLASS A RECLAIMED WATER TREATMENT SYSTEM

	FILTER LABOR[a]					FILTER POWER			TOTAL	FILTER FEED PUMP POWER[a]							FILTER FEED PUMP LABOR[a]					FILTER FEED O&M	
Project	Filter labor, hrs/year	annual usage %	actual annual labor, hrs	labor cost $/hr	annual Filter labor cost, $	Filter power use, kwh/year	cost per kw-hr, $	annual Filter power, $	FILTER O&M COST, $	Filter TDH, ft	overall pump efficiency, %	annual power req's @ peak flow, kw-hr	annual pump usage, %	actual annual power req's, kw-hr	cost per kw-hr, $	annual pump power cost, $	peak flow annual labor req's, hrs	annual usage %	actual annual labor, hrs	labor cost $/hr	annual pump O&M labor cost, $	Total feed pumps constr cost, $	O&M costs, $
Tam O'Shanter	1,500	42%	626	45	28,148	28,900	0.034	983	31,879	30	75%	13,254	42%	5,527	0.034	188	450	42%	188	45	8,444	61,088	305
NewCastle	1,500	42%	626	45	28,148	50,000	0.034	1,700	32,596	30	75%	22,930	42%	9,562	0.034	325	450	42%	188	45	8,444	61,088	305
Sammamish River	3,500	42%	1,460	45	65,678	292,800	0.034	9,955	90,294	30	75%	134,280	42%	55,995	0.034	1,904	700	42%	292	45	13,136	287,790	1,439
North Sammamish River	2,500	42%	1,043	45	46,913	85,400	0.034	2,904	55,015	30	75%	39,165	42%	16,332	0.034	555	600	42%	250	45	11,259	122,175	611
Covington	1,500	42%	626	45	28,148	50,000	0.034	1,700	32,596	30	75%	22,930	42%	9,562	0.034	325	450	42%	188	45	8,444	61,088	305

TASK 4.20 - TERTIARY TREATMENT O&M COSTS
CLASS A RECLAIMED WATER TREATMENT SYSTEM

	TOTAL	CHLORINE FEED SYSTEM O&M					CHLORINE FEED SYSTEM LABOR[a]					CHLORINE CHEMICAL COSTS[a]						CONTACT TANK		TOTAL	TOTAL	After
Project	FILTER FEED SYST O&M, $	Cl system cost w/UFC upgrade, $	O&M costs, $	Cl system power use, kwh/year	cost per kw-hr, $	annual Cl syst power, $	Cl system labor, hrs/year	annual usage %	actual annual labor, hrs	labor cost $/hr	annual Cl system labor cost, $	Chlorine dosage, mg/l	Chlorine peak use, lbs/day	Annual use, %	Annual vol, tons	Chlorine cost, $/ton	Annual Chlorine cost, $	Total Cl tank cost, $	O&M costs, $	CHLORINE SYST O&M, $	CLASS A SYSTEM O&M, 1995$	ENR Cost Indexation[b,c] $2,000
Tam O'Shanter	8,938	184,620	923	8,500	0.034	289	300	42%	125	45	5,630	5	12.06	42%	0.92	200	184	141,180	706	7,731	55,348	$ 69,000
NewCastle	9,075	184,620	923	8,500	0.034	289	500	42%	209	45	9,383	5	20.86	42%	1.59	200	318	141,180	706	11,618	63,172	$ 78,000
Sammamish River	16,478	233,490	1,167	13,500	0.034	459	850	42%	354	45	15,950	5	122.18	42%	9.30	200	1,860	366,525	1,833	21,269	174,818	$ 216,000
North Sammamish River	12,425	211,770	1,059	10,000	0.034	340	600	42%	250	45	11,259	5	35.64	42%	2.71	200	542	207,698	1,038	14,239	98,083	$ 121,000
Covington	9,075	184,620	923	8,500	0.034	289	500	42%	209	45	9,383	5	20.86	42%	1.59	200	318	141,180	706	11,618	63,172	$ 78,000

RECLAIMED WATER ASSISTANCE PROGRAM

TASK 4.20 - SECONDARY TREATMENT PLANT COSTS

		SECONDARY TREATMENT PLANT								LIFT STATION									
Project	Plant capacity MGD	Base construction cost, $	Mob/ Demob, 0%, $	Contin- gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Secondary WWTP constr. cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Lift station base costs[a,b,c] $	Mob/ Demob, 0%, $	Contin- gency 25%, $	Contractor O&P, 0%, $	Sales tax 8.6%, $	Lift station constr. cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	TOTAL PROJECT COST, 1995$	After ENR Cost Indexation[d, e] $2,000
Tam O'Shanter	0.44	2,822,000	0	705,500	0	303,365	3,830,865	1,340,803	5,171,668	248,000	0	62,000	0	26,660	336,660	117,831	454,491	5,626,159	$ 6,937,000
NewCastle	0.5	2,822,000	0	705,500	0	303,365	3,830,865	1,340,803	5,171,668	248,000	0	62,000	0	26,660	336,660	117,831	454,491	5,626,159	$ 6,937,000
Sammamish River	4.53	11,700,000	0	2,925,000	0	1,257,750	15,882,750	5,558,963	21,441,713	110,000	0	27,500	0	11,825	149,325	52,264	201,589	21,643,301	$ 26,685,000
North Sammamish Rive	1.32	5,179,000	0	1,294,750	0	556,743	7,030,493	2,460,672	9,491,165	47,300	0	11,825	0	5,085	64,210	22,473	86,683	9,577,848	$ 11,809,000
Covington	0.5	2,822,000	0	705,500	0	303,365	3,830,865	1,340,803	5,171,668	24,800	0	6,200	0	2,666	33,666	11,783	45,449	5,217,117	$ 6,433,000

a. Since the Sammamish River project would be located at the York pumping station,
it is assumed that the existing pumps will be used and that a complete new lift station would not be needed. It is assumed that 10 percent of the estimated cost will be needed to provide for piping connections and associated modifications.

b. Since the Covington sattellite plant would be located at the Covington pumping station,
it is assumed that the existing pumps will be used and that a complete new lift station would not be needed. It is assumed that 10 percent of the estimated cost will be needed to provide for piping connections and associated modifications.

c. Since the North Sammamish sattellite plant would be located at the Kenmore pumping station,
it is assumed that the existing pumps will be used and that a complete new lift station would not be needed. It is assumed that 10 percent of the estimated cost will be needed to provide for piping connections and associated modifications.

d. ENR Sept-1995, Seattle area, construction =5800

e. ENR Feb-2000, Seattle area, construction = 7151

TASK 4.20 - SECONDARY TREATMENT PLANT O&M COSTS

Project	Average capacity MGD	WWTP O&M cost[a], $	Lift Sta O&M cost, $	Total O&M cost, $	After ENR cost Indexation[b,c] $2,000
Tam O'Shanter	0.289	17,629	22,000	39,629	$ 49,000
NewCastle	0.5	30,500	22,000	52,500	$ 65,000
Sammamish River	2.928	178,608	36,500	215,108	$ 266,000
North Sammamish River	0.854	52,094	24,000	76,094	$ 94,000
Covington	0.5	30,500	22,000	52,500	$ 65,000

a. Assumes irrigation operations 5 months/year.

b. ENR Sept-1995, Seattle area, construction =5800

c. ENR Feb-2000, Seattle area, construction = 7151

1- Tam O'Shanter Project

CALCULATION OF LEVELIZED UNIT COSTS

Design Flow =	0.44	Discount Rate =	3%
Average Flow, MGD =	0.289	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	12,000	Life Cycle, years =	35
Water Quality Class =	A	Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[c]								
Year	Distribution	Tertiary	Secondary	Total	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000$	Annual Cash Flow P.Worth, 2000 $	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual unit cost, $/CCf
1	(1,858,000)	(2,234,000)	(6,937,000)	(11,029,000)				0%	0				(783,139)	(11,029,000)	(11,029,000)	0	(760,329)	N.A.
2					(23,000)	(69,000)	(49,000)	50%	(70,500)				(783,139)	(70,500)	(66,453)	29,462	(808,684)	(27.4)
3					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(129,035)	58,925	(857,683)	(14.6)
4					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(125,277)	58,925	(836,809)	(14.2)
5					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(121,628)	58,925	(816,543)	(13.9)
6					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(118,085)	58,925	(796,867)	(13.5)
7					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(114,646)	58,925	(777,764)	(13.2)
8					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(111,307)	58,925	(759,217)	(12.9)
9					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(108,065)	58,925	(741,211)	(12.6)
10					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(104,917)	58,925	(723,729)	(12.3)
11					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(101,861)	58,925	(706,756)	(12.0)
12					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(98,895)	58,925	(690,278)	(11.7)
13					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(96,014)	58,925	(674,280)	(11.4)
14					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(93,218)	58,925	(658,747)	(11.2)
15					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(90,503)	58,925	(643,667)	(10.9)
16					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(87,867)	58,925	(629,026)	(10.7)
17					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(85,307)	58,925	(614,812)	(10.4)
18					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(82,823)	58,925	(601,012)	(10.2)
19					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(80,410)	58,925	(587,613)	(10.0)
20					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(78,068)	58,925	(574,605)	(9.8)
21					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(75,794)	58,925	(561,976)	(9.5)
22					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(73,587)	58,925	(549,714)	(9.3)
23					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(71,444)	58,925	(537,810)	(9.1)
24					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(69,363)	58,925	(526,253)	(8.9)
25					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(67,342)	58,925	(515,032)	(8.7)
26					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(65,381)	58,925	(504,137)	(8.6)
27					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(63,477)	58,925	(493,561)	(8.4)
28					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(61,628)	58,925	(483,292)	(8.2)
29					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(59,833)	58,925	(473,322)	(8.0)
30					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(58,090)	58,925	(463,643)	(7.9)
31					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(56,398)	58,925	(454,246)	(7.7)
32					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(54,756)	58,925	(445,122)	(7.6)
33					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(53,161)	58,925	(436,264)	(7.4)
34					(23,000)	(69,000)	(49,000)	100%	(141,000)				(783,139)	(141,000)	(51,612)	58,925	(427,664)	(7.3)
35					(23,000)	(69,000)	(49,000)	100%	(141,000)	792,747	595,733	1,849,867	(783,139)	3,097,347	1,100,746	58,925	731,540	12.4
													Total:		(12,704,497)	1,973,985	(20,400,128)	
																	Levelized Unit Cost in 2000 $, $/ccf:	**(10.33)**

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

c. Salvage value based on static facilities having a 75-year useful life, using straight line depreciation.

2- Newcastle Project

CALCULATION OF LEVELIZED UNIT COSTS

Design Flow =	0.5	Discount Rate =	3%
Average Flow, MGD =	0.5	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	7,900	Life Cycle, years =	35
Water Quality Class =	A	Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[c]								
Year	Distribution	Tertiary	Secondary	Total	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000$	Annual Cash Flow P.Worth, 2000 $	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual unit cost, $/CCf
1	(1,054,000)	(2,234,000)	(6,937,000)	(10,225,000)				0%	0				(726,049)	(10,225,000)	(10,225,000)	0	(704,902)	N.A.
2					(32,000)	(78,000)	(65,000)	50%	(87,500)				(726,049)	(87,500)	(82,477)	50,973	(771,871)	(15.1)
3					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(160,150)	101,946	(839,438)	(8.2)
4					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(155,485)	101,946	(820,085)	(8.0)
5					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(150,957)	101,946	(801,296)	(7.9)
6					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(146,560)	101,946	(783,055)	(7.7)
7					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(142,291)	101,946	(765,345)	(7.5)
8					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(138,147)	101,946	(748,150)	(7.3)
9					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(134,123)	101,946	(731,456)	(7.2)
10					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(130,216)	101,946	(715,249)	(7.0)
11					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(126,424)	101,946	(699,513)	(6.9)
12					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(122,741)	101,946	(684,236)	(6.7)
13					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(119,166)	101,946	(669,404)	(6.6)
14					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(115,696)	101,946	(655,004)	(6.4)
15					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(112,326)	101,946	(641,023)	(6.3)
16					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(109,054)	101,946	(627,450)	(6.2)
17					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(105,878)	101,946	(614,272)	(6.0)
18					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(102,794)	101,946	(601,477)	(5.9)
19					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(99,800)	101,946	(589,056)	(5.8)
20					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(96,893)	101,946	(576,996)	(5.7)
21					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(94,071)	101,946	(565,287)	(5.5)
22					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(91,331)	101,946	(553,920)	(5.4)
23					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(88,671)	101,946	(542,883)	(5.3)
24					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(86,088)	101,946	(532,168)	(5.2)
25					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(83,581)	101,946	(521,765)	(5.1)
26					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(81,147)	101,946	(511,665)	(5.0)
27					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(78,783)	101,946	(501,859)	(4.9)
28					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(76,488)	101,946	(492,339)	(4.8)
29					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(74,261)	101,946	(483,096)	(4.7)
30					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(72,098)	101,946	(474,123)	(4.7)
31					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(69,998)	101,946	(465,410)	(4.6)
32					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(67,959)	101,946	(456,952)	(4.5)
33					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(65,980)	101,946	(448,740)	(4.4)
34					(32,000)	(78,000)	(65,000)	100%	(175,000)				(726,049)	(175,000)	(64,058)	101,946	(440,767)	(4.3)
35					(32,000)	(78,000)	(65,000)	100%	(175,000)	449,707	595,733	1,849,867	(726,049)	2,720,307	966,752	101,946	595,918	5.8
													Total:		(12,703,940)	3,415,199	(20,434,337)	
															Levelized Unit Cost in 2000 $, $/ccf:			**(5.98)**

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

c. Salvage value based on static facilities having a 75-year useful life, using straight line depreciation.

3-Sammamish River Project

CALCULATION OF LEVELIZED UNIT COSTS

Design Flow =	4.53	Discount Rate =	3%
Average Flow, MGD =	2.928	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	27,900	Life Cycle, years =	35
Water Quality Class =	A	Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[e]								
Year	Distribution	Tertiary	Secondary	Total[c]	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000$	Annual Cash Flow P.Worth, 2000 $	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual unit cost, $/CCf
1	(9,370,000)	(7,507,000)	(26,685,000)	(43,562,000)				0%	0				(3,093,218)	(43,562,000)	(43,562,000)	0	(3,003,125)	N.A.
2					(70,000)	(216,000)	(266,000)	50%	(276,000)				(3,093,218)	(276,000)	(260,156)	298,499	(3,191,655)	(10.7)
3					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(505,158)	596,997	(3,382,733)	(5.7)
4					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(490,445)	596,997	(3,300,285)	(5.5)
5					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(476,160)	596,997	(3,220,237)	(5.4)
6					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(462,291)	596,997	(3,142,522)	(5.3)
7					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(448,827)	596,997	(3,067,070)	(5.1)
8					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(435,754)	596,997	(2,993,815)	(5.0)
9					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(423,062)	596,997	(2,922,694)	(4.9)
10					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(410,740)	596,997	(2,853,645)	(4.8)
11					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(398,777)	596,997	(2,786,607)	(4.7)
12					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(387,162)	596,997	(2,721,521)	(4.6)
13					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(375,885)	596,997	(2,658,331)	(4.5)
14					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(364,937)	596,997	(2,596,982)	(4.4)
15					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(354,308)	596,997	(2,537,419)	(4.3)
16					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(343,988)	596,997	(2,479,591)	(4.2)
17					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(333,969)	596,997	(2,423,448)	(4.1)
18					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(324,242)	596,997	(2,368,940)	(4.0)
19					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(314,798)	596,997	(2,316,019)	(3.9)
20					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(305,629)	596,997	(2,264,640)	(3.8)
21					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(296,727)	596,997	(2,214,757)	(3.7)
22					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(288,085)	596,997	(2,166,328)	(3.6)
23					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(279,694)	596,997	(2,119,308)	(3.5)
24					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(271,547)	596,997	(2,073,659)	(3.5)
25					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(263,638)	596,997	(2,029,338)	(3.4)
26					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(255,959)	596,997	(1,986,309)	(3.3)
27					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(248,504)	596,997	(1,944,533)	(3.3)
28					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(241,266)	596,997	(1,903,974)	(3.2)
29					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(234,239)	596,997	(1,864,596)	(3.1)
30					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(227,417)	596,997	(1,826,365)	(3.1)
31					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(220,793)	596,997	(1,789,248)	(3.0)
32					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(214,362)	596,997	(1,753,211)	(2.9)
33					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(208,118)	596,997	(1,718,225)	(2.9)
34					(70,000)	(216,000)	(266,000)	100%	(552,000)				(3,093,218)	(552,000)	(202,057)	596,997	(1,684,257)	(2.8)
35					(70,000)	(216,000)	(266,000)	100%	(552,000)	3,997,867	2,001,867	7,116,000	(3,093,218)	12,563,733	4,464,942	596,997	3,009,835	5.0
													Total:		(49,965,753)	19,999,408	(80,295,552)	
															Levelized Unit Cost in 2000 $, $/ccf[d] :			**(4.01)**

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

c. Assumes the use of the existing York pumping station pumps; if a complete new lift station were needed, secondary treatment capital costs would be $ 28,922,000, for a total capital cost of $45,807,000.

d. Levelized unit cost with new package lift station would be $ 4.17/ccf.

e. Salvage value based on static facilities having a 75-year useful life, using straight line depreciation.

4- North Sammamish River Project

CALCULATION OF LEVELIZED UNIT COSTS

Design Flow =	1.32	Discount Rate =	3%
Average Flow, MGD =	0.854	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	9,100	Life Cycle, years =	35
Water Quality Class =	A	Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[e]								
Year	Distribution	Tertiary	Secondary	Total[c]	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000$	Annual Cash Flow P.Worth, 2000 $	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual unit cost, $/CCf
1	(1,906,000)	(3,756,000)	(11,809,000)	(17,471,000)				0%	0				(1,240,568)	(17,471,000)	(17,471,000)	0	(1,204,435)	N.A.
2					(26,000)	(121,000)	(94,000)	50%	(120,500)				(1,240,568)	(120,500)	(113,583)	87,062	(1,289,854)	(14.8)
3					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(220,549)	174,124	(1,376,295)	(7.9)
4					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(214,125)	174,124	(1,343,229)	(7.7)
5					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(207,889)	174,124	(1,311,125)	(7.5)
6					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(201,834)	174,124	(1,279,956)	(7.4)
7					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(195,955)	174,124	(1,249,695)	(7.2)
8					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(190,248)	174,124	(1,220,316)	(7.0)
9					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(184,706)	174,124	(1,191,792)	(6.8)
10					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(179,327)	174,124	(1,164,099)	(6.7)
11					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(174,104)	174,124	(1,137,213)	(6.5)
12					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(169,033)	174,124	(1,111,109)	(6.4)
13					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(164,109)	174,124	(1,085,766)	(6.2)
14					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(159,329)	174,124	(1,061,162)	(6.1)
15					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(154,689)	174,124	(1,037,273)	(6.0)
16					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(150,183)	174,124	(1,014,081)	(5.8)
17					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(145,809)	174,124	(991,564)	(5.7)
18					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(141,562)	174,124	(969,703)	(5.6)
19					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(137,439)	174,124	(948,479)	(5.4)
20					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(133,436)	174,124	(927,872)	(5.3)
21					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(129,549)	174,124	(907,866)	(5.2)
22					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(125,776)	174,124	(888,443)	(5.1)
23					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(122,113)	174,124	(869,586)	(5.0)
24					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(118,556)	174,124	(851,277)	(4.9)
25					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(115,103)	174,124	(833,502)	(4.8)
26					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(111,750)	174,124	(816,245)	(4.7)
27					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(108,496)	174,124	(799,490)	(4.6)
28					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(105,335)	174,124	(783,223)	(4.5)
29					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(102,267)	174,124	(767,430)	(4.4)
30					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(99,289)	174,124	(752,098)	(4.3)
31					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(96,397)	174,124	(737,211)	(4.2)
32					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(93,589)	174,124	(722,758)	(4.2)
33					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(90,863)	174,124	(708,727)	(4.1)
34					(26,000)	(121,000)	(94,000)	100%	(241,000)				(1,240,568)	(241,000)	(88,217)	174,124	(695,104)	(4.0)
35					(26,000)	(121,000)	(94,000)	100%	(241,000)	813,227	1,001,600	3,149,067	(1,240,568)	4,722,893	1,678,438	174,124	1,082,208	6.2
													Total:		(20,537,771)	5,833,161	(32,965,771)	
															Levelized Unit Cost in 2000 $, $/ccf[d] :			**(5.65)**

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

c. Assumes the use of the existing Kenmore pumping station pumps; if a complete new lift station were needed, secondary treatment capital costs would be $12,771,000, for a total capital cost of $ 18,433,000.

d. Levelized unit cost with new package lift station would be $ 5.89/ccf.

e. Salvage value based on static facilities having a 75-year useful life, using straight line depreciation.

5- Covington Project

CALCULATION OF LEVELIZED UNIT COSTS

Design Flow =	0.5	Discount Rate =	3%
Average Flow, MGD =	0.5	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	17,100	Life Cycle, years =	35
Water Quality Class =	A	Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[c]								
Year	Distribution	Tertiary	Secondary	Total	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000$	Annual Cash Flow P.Worth, 2000 $	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual unit cost, $/CCf
1	(2,457,000)	(2,234,000)	(6,433,000)	(11,124,000)				0%	0				(789,885)	(11,124,000)	(11,124,000)	0	(766,878)	N.A.
2					(23,000)	(78,000)	(65,000)	50%	(83,000)				(789,885)	(83,000)	(78,235)	50,973	(827,542)	(16.2)
3					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(151,914)	101,946	(888,856)	(8.7)
4					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(147,489)	101,946	(867,802)	(8.5)
5					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(143,193)	101,946	(847,362)	(8.3)
6					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(139,022)	101,946	(827,516)	(8.1)
7					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(134,973)	101,946	(808,249)	(7.9)
8					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(131,042)	101,946	(789,542)	(7.7)
9					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(127,225)	101,946	(771,381)	(7.6)
10					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(123,520)	101,946	(753,748)	(7.4)
11					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(119,922)	101,946	(736,630)	(7.2)
12					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(116,429)	101,946	(720,009)	(7.1)
13					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(113,038)	101,946	(703,873)	(6.9)
14					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(109,746)	101,946	(688,207)	(6.8)
15					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(106,549)	101,946	(672,997)	(6.6)
16					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(103,446)	101,946	(658,230)	(6.5)
17					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(100,433)	101,946	(643,893)	(6.3)
18					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(97,508)	101,946	(629,974)	(6.2)
19					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(94,667)	101,946	(616,460)	(6.0)
20					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(91,910)	101,946	(603,340)	(5.9)
21					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(89,233)	101,946	(590,602)	(5.8)
22					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(86,634)	101,946	(578,235)	(5.7)
23					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(84,111)	101,946	(566,228)	(5.6)
24					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(81,661)	101,946	(554,571)	(5.4)
25					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(79,283)	101,946	(543,253)	(5.3)
26					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(76,973)	101,946	(532,265)	(5.2)
27					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(74,731)	101,946	(521,597)	(5.1)
28					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(72,555)	101,946	(511,240)	(5.0)
29					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(70,441)	101,946	(501,185)	(4.9)
30					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(68,390)	101,946	(491,422)	(4.8)
31					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(66,398)	101,946	(481,944)	(4.7)
32					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(64,464)	101,946	(472,742)	(4.6)
33					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(62,586)	101,946	(463,807)	(4.5)
34					(23,000)	(78,000)	(65,000)	100%	(166,000)				(789,885)	(166,000)	(60,763)	101,946	(455,133)	(4.5)
35					(23,000)	(78,000)	(65,000)	100%	(166,000)	1,048,320	521,267	1,715,467	(789,885)	3,119,053	1,108,460	101,946	720,741	7.1
													Total:		(13,284,025)	3,415,199	(21,365,975)	
																	Levelized Unit Cost in 2000 $, $/ccf:	(6.26)

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

c. Assumes the use of the existing Covington pumping station pumps; if a complete new lift station were needed, secondary treatment capital costs would be $6,937,000, for a total capital cost of $ 11,628,000.

d. Levelized unit cost with new package lift station would be $ 6.73/ccf.

c. Salvage value based on static facilities having a 75-year useful life, using straight line depreciation.